REFERENCE DEPT.

AVIATION

The Oldest American Aeronautical Magazine

APRIL 26, 1926 Issued Weekly PRICE 15 CENTS

The Los Angeles at the Mast at Lakehurst, N. J.

Photo International Newsreel

VOLUME XX

NUMBER 17

SPECIAL FEATURES

AERONAUTICAL WORK AT M.I.T.

CONVERTIBLE MONOPLANE-BIPLANE WINGS

THE EUROPEAN FLIGHT OF THE NORGE

GARDNER PUBLISHING CO., Inc.
HIGHLAND, N. Y.
225 FOURTH AVENUE, NEW YORK

Entered as Second-Class Matter, Nov. 22, 1920, at the Post Office, at Highland, N. Y. under Act of March 3, 1879.

TOLEDO PUBLIC

Blazing Trail—

SEVENTEEN YEARS ago the airplane was a toy and a circus day marvel. Today, it is an accepted tool of commerce, of the Mail Service and of passenger transportation. All through these seventeen years of thrilling progress the men of The Glenn L. Martin Co. have blazed the trail, leading the way to new standards of dependability and safety, contributing unceasingly to the mastery of the air. The purchaser of a Glenn L. Martin airplane is safeguarded by these seventeen years of insistence upon safety and sustained leadership.

Consolidated Airplanes Wear Well

Quality is first in their design and manufacture
Up-keep, ordinarily a serious problem is almost nil

Trade Mark *Copyrighted*

Only American manufacturers specializing in training airplanes
Five years continuous development on one basic design
Safest training and sportsmen's airplanes ever flown

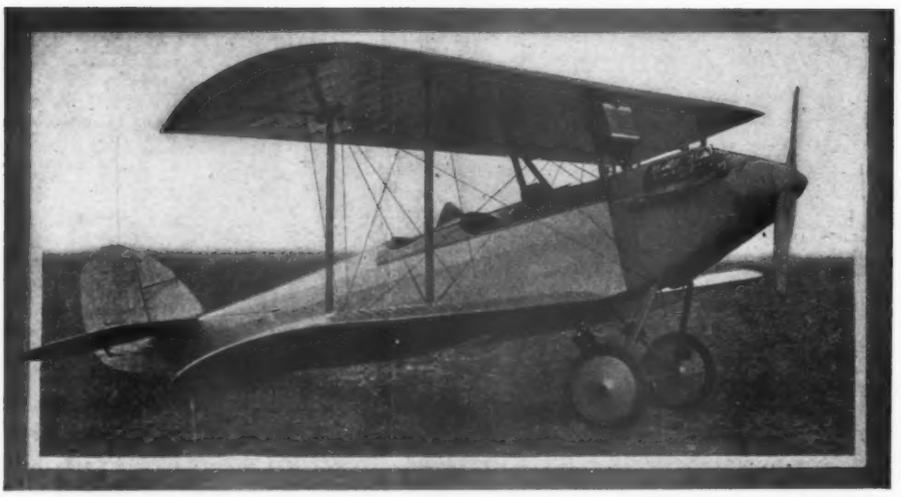
Contractors to United States Army and Navy

CONSOLIDATED AIRCRAFT CORPORATION

Buffalo, New York

When Writing to Advertisers, Please Mention AVIATION

WACO



REAL PERFORMANCE IN A THREE-PLACE SHIP WITH STOCK OX5 MOTOR

You will know why every one is clamoring for the Waco the moment you are familiar with its performance and the superiority of its workmanship.

WACO DISTRIBUTORS

NEW JERSEY and DELAWARE The Ludington Exhibition Company Atlantic Building, Philadelphia, Pa.	MISSOURI Waco Sales Company Richard's Flying Field, Kansas City, Mo.
PENNSYLVANIA and MARYLAND Roisner Aero Service Hagerstown, Md.	ILLINOIS The Mid-West Airways Corporation Monmouth, Ill.
NORTH CAROLINA Lloyd O. Yost Box 203, Pinehurst, N. C.	INDIANA Muncie Aerial Company Muncie, Ind.
GEORGIA Douglas H. Davis Griffin, Ga.	MICHIGAN The Aircraft Distributors 2320 N. Saginaw St., Flint, Mich.
FLORIDA Otis A. Hardin Sebring, Fla.	OHIO and KENTUCKY Embry-Riddle Company Lunken Airport, Cincinnati, Ohio.
LOUISIANA The Southern Dusting Co., Inc. Box 216, Tallulah, La.	NEW ENGLAND New England Aircraft Co 805 Main St., Hartford, Conn.
OKLAHOMA The Aircraft Sales Company of Oklahoma P. O. Box 1525, Tulsa, Okla.	WISCONSIN The Roy Larson Aircraft Co. Larson, Wisconsin.

ADVANCE AIRCRAFT CO.
Troy, Ohio

APRIL 26, 1926

AVIATION

VOL. XX. NO. 17

Published every Monday

CONTENTS

Editorials 623
The Flight of the Airship Norge 624
American Commercial Flying 626
House Discusses Civil Aviation Bill 627
On Fuels For Aircraft Engines 629
Aeronautical Work at M.I.T. 630
Convertible Monoplane-Biplane Wings 632
German Air Transport Recognized 635

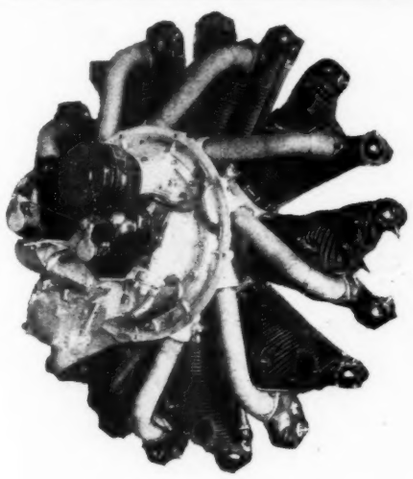
GARDNER PUBLISHING COMPANY, Inc., *Publishers*

BUSINESS AND EDITORIAL OFFICES: 225 FOURTH AVENUE, NEW YORK
CABLE ADDRESS: AEROENG
Publication Office
HIGHLAND, N. Y.

Subscription price: Four dollars per year. Canada, five dollars. Foreign, six dollars. Single copies, fifteen cents. Back numbers 25 cents. Copyright 1926, by the Gardner Publishing Company.

Issued every Monday. Forms close ten days previously. Entered as second-class matter Nov. 22, 1920, at the Post Office at Highland, N. Y., under act of March 3, 1879.

SCINTILLA



The new 400 h.p. 9 cyl. Pratt & Whitney "Wasp" radial air-cooled engine. This latest American radial engine weighs only 1.69 lbs. per horsepower and is equipped with two Type AG 9D SCINTILLA Aircraft Magnetos.

No. 6 in a series of modern American aircraft engines for which SCINTILLA Aircraft Magnetos have been selected as ignition equipment.

AIRCRAFT Engineers and Pilots insist upon ignition equipment of the utmost dependability.

BECAUSE SCINTILLA Aircraft Magnetos have notably met this requirement they have been adopted for most of the modern American military and commercial engines.

Contractors to the U. S. Army and Navy.

SCINTILLA MAGNETO COMPANY, INC.

***Factory and Offices* SIDNEY, NEW YORK**

SEND FOR DESCRIPTIVE BOOKLET

More Pilots Know More About

WRIGHT WHIRLWIND ENGINES

than any other Aeronautical Engine now manufactured in America!

That's why
More Pilots fly them!
Huff-Daland "Petrel" powered with a Wright Whirlwind 200 H. P. air-cooled engine. A thoroughly proven plane for crop or mosquito dusting, photography and passenger work. Send for Bulletin No. 8.
WRIGHT
WRIGHT AERONAUTICAL CORPORATION
Paterson, N. J., U. S. A.

L. D. GARDNER
PRESIDENT
EARL D. OSBORN
VICE PRESIDENT
L. D. WEBSTER
TREASURER
GEORGE NEWBOLD
BUSINESS MANAGER

AVIATION

W. LAURENCE LEPAGE
EDITOR
VIRGINIUS E. CLARK
RALPH H. UPSON
CONTRIBUTORS

VOL. XX APRIL 26, 1926 No. 17

Legislation

THE BINGHAM BILL passed the Senate in December and the Merritt or Parker Bill passed the House earlier, in April. The Bingham Bill was drawn along broad lines and affected only interstate flying. The House Bill, which was printed in our March 22 issue, is much more elaborate and opens the way for very drastic regulations covering planes, fliers and landing facilities. By the time that this issue reaches our readers the two bills will have gone into a committee of the Senate and the House and a compromise bill will probably have been passed by Congress.

It was inevitable that, sooner or later, regulations governing aircraft would pass Congress. AVIATION has consistently tried to spread knowledge about air laws and has emphasized the dangers of over strict legislation. The series of letters printed in AVIATION about air regulations were carefully studied by the members of the committees which framed the bills. Those letters which came in too late to publish were sent directly to Washington. Furthermore, the figures of mileage flown by commercial pilots during 1925 were brought out before the House during the discussion of the bill. Whatever sort of legislation Congress decides to pass, AVIATION feels that it has done its part in giving information and in trying to stimulate clear thinking.

The law, when passed, is likely to be deemed unsatisfactory and burdensome, however, by many pilots and airplane owners. It should also be remembered that the public, as represented by Congress, has a right to demand protection against irresponsible fliers. Also it must not be forgotten that legislation is imperative if air transport lines are to be established. If the regulations do in practice prove burdensome, a united protest from the fliers could force a modification for, after all, both Congress and the Department of Commerce do earnestly desire to foster civilian aviation.

International Air Navigation

THE SPECTACULAR growth of aircraft during the war period brought home to Europe the necessity which would arise for some sort of uniform regulations for international air navigation. A sub-committee of the Peace Conference was established shortly after the war to go into the matter and lay down regulations which could be adopted by all countries.

It is hard for an American to realize the importance of such regulations and their scope. Our country is extremely large and it is rare that we wish to cross its borders even on an extended flight. In Europe, on the other hand, one can hardly get well up in the air before crossing the boundaries of another country. The regulations necessary are partly military and partly civilian. There are areas containing military defenses which are supposedly secret and which fliers of another country are not supposed to fly over. There are regulations to cover the flying of military planes over the territory of a neighboring state.

At the time of the Armistice and Peace Conference, when the main outlines of the Air Convention were drawn, the military phases perhaps predominated, but, even from the civilian viewpoint, certain regulations were necessary.

Planes could not be allowed to land or fly over a country unless they bore identification marks. Otherwise the whole system of custom and emigration laws would break down. A uniformity of markings, and regulations as to methods of landing fields, right of way in the air, lights for night flying, etc. were essential. To the air enthusiast, many of the regulations in the Convention relating to international air legislation may seem irksome but actually, when flying from one country to another, it was a case of having detailed regulations or else of eliminating international flying. Some day national boundaries may not be the bar to intercommunication that they now are, but, until that day arrives, uniform regulation for all countries is better than each state having its own particular methods of controlling fliers who come from other countries.

Canada has been most lenient and helpful in allowing American planes to fly over its territory. Canada has signed the Air Convention. Some day they may wish to discourage American airplanes and they have a right to do so. The International Air Navigation Convention came up before the Senate in 1919 and it has been lying dormant there ever since. In the mean time, the signatories to the Convention, through their permanent committee, are modifying and improving the regulations. This is a task in which the United States should have a part and it is to be hoped that the Senate will again take the matter up.

The Senate apparently feels that ratifying the International Air Convention might be getting us tangled up with the League of Nations and so it has carefully avoided bringing up any discussion on the convention. The House has, however, had the good sense to realize that, at some time which may not be so far in the future, air travel between the United States and Europe and South America might be a matter of common occurence and that it would be well to frame the civil aeronautic regulations so that they would coincide in a general way with the international regulations on the subject. At present, this country treats flying boats going to the West Indies or Cuba in the same manner as it treats ocean going steamers. The ocean laws are extremely ancient and complicated and apply to voyages which could last for months. A pilot flying alone from the United States to Cuba now has to swear solemnly that none of the crew died on the journey. This is really rather absurd and should be remedied.

The Flight of the Airship Norge

Italy-England-Norway-Russia Flight Carried out Successfully as Preliminary to Flight into Arctic.

AS IS well known, the Amundsen Ellsworth Arctic Expedition, to be undertaken this year, is to be carried out with the Italian semi-rigid airship, Norge, designed by Col. Umberto Nobile, who will accompany Lincoln Ellsworth and Roald Amundsen as pilot of the airship. The base for the airship while in the Arctic regions is to be at King's Bay, Spitzbergen and preparations are already being made for the housing of the ship there. Work has progressed considerably on the hangar which is to accommodate the airship.

European Flight

In the meantime, the airship has left for Italy and reached Leningrad, Russia, on its way to Spitzbergen. The Norge left Ciampino Flying Field at 9:30 a.m. on April 10, and proceeded to Pulham, England. Maj. George H. Scott, of the British Royal Air Force, who piloted the R-34 across the Atlantic from England to America and back in 1919, was pilot of the Norge on the flight from Italy to Pulham. Lieutenant Mercier, the French airship pilot, was also on the Norge when she left Ciampino Field. Many thousands of persons saw the airship leave and an official farewell was staged by the attendance of numerous Government officials. The flight to Pulham involved a distance of about 1,400 miles and, if weather conditions proved unsuitable for the continuance of the flight, it was planned to land en route at Cuirs, near Marseilles. Furthermore, preparations were made for the possible landing of the airship at Rochefort, and Paris, should the need arise.

The airship's departure was without untoward incident and within a few minutes of leaving the ground she was disappearing at an altitude of about 2,500 ft. over the streets of Rome, escorted by a guard of honor consisting of two Italian Air Service airplanes. The coast of the Mediterranean was reached at 10:15 a.m.

Colonel Nobile, constructor and first pilot of the Norge, decided to fly to the North end of the Isle of Corsica and from there along the French coast, where he had arranged to receive weather reports upon which to base his decision as to whether he would descend at Cuers, near Toulon, or continue the flight direct to Pulham.

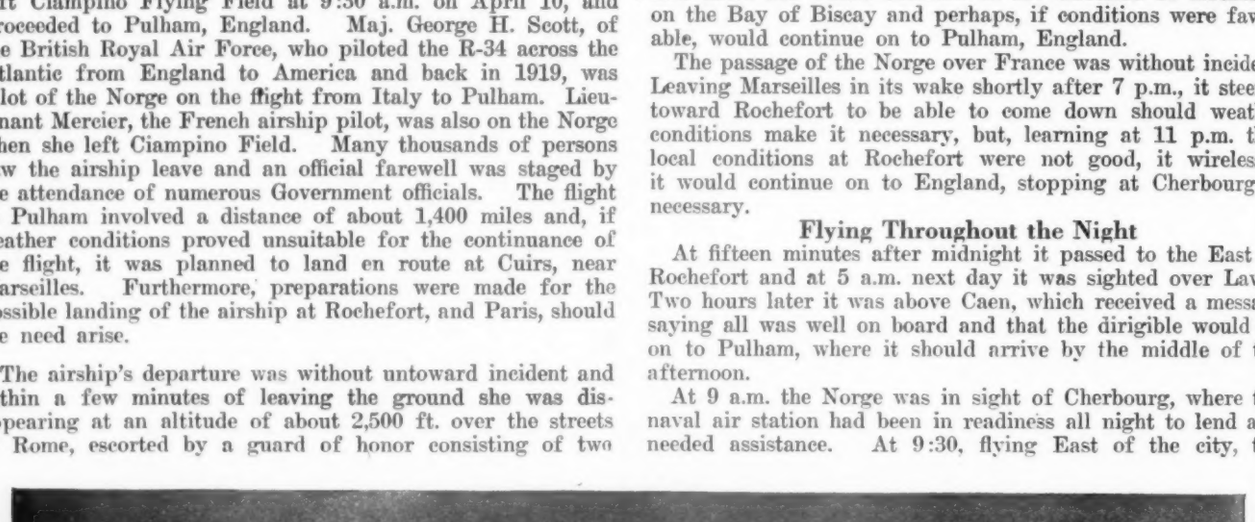
Weather conditions, which, the day before, had been bad, there being then a very high wind, had considerably improved and the Norge passed slightly South of Toulon, France at 5:30 p.m., flying in a westerly direction. Previously the airship and wirelessed the Cuers Aviation base that it would not halt there but would continue in the direction of Rochefort on the Bay of Biscay and perhaps, if conditions were favorable, would continue on to Pulham, England.

The passage of the Norge over France was without incident. Leaving Marseilles in its wake shortly after 7 p.m., it steered toward Rochefort to be able to come down should weather conditions make it necessary, but, learning at 11 p.m. that local conditions at Rochefort were not good, it wirelessed it would continue on to England, stopping at Cherbourg if necessary.

Flying Throughout the Night

At fifteen minutes after midnight it passed to the East of Rochefort and at 5 a.m. next day it was sighted over Laval. Two hours later it was above Caen, which received a message saying all was well on board and that the dirigible would go on to Pulham, where it should arrive by the middle of the afternoon.

At 9 a.m. the Norge was in sight of Cherbourg, where the naval air station had been in readiness all night to lend any needed assistance. At 9:30, flying East of the city, the



The Italian semi-rigid Norge on one of her early test flights over Rome

airship passed Cape Hogue and, despite a strong Northwest wind, continued seaward for the English coast.

The coast was crossed at Brighton at 11:20 a.m., April 11, and the occupants of the airship caught sight of the little Norfolk village of Pulham, the British airship base, shortly after 2:00 p.m. The Norge had covered the distance from Rome in a non-stop flight of 29 hr. Considerable difficulty was experienced in the landing at Pulham owing largely to temperature differences and not the least on account of the extreme care which Colonel Nobile was exercising to avoid any possible damage to the ship, which might cause a delay. A landing was finally executed at 6:00 p.m. and the airship taken into one of the airship hangars.

The crew experienced no undue hardships during the journey from Rome with the exception of those due to lack of food and water, for very little was carried in the way of supplies, and lack of sleep constituted another hardship. The Norge is stripped for action. She is built with little regard for comfort. She carries two Morris chairs and two stools for the navigator and pilot but, with the exception of these, there is little room for rest. The airship carried 21 men to England but how many she will carry on the actual polar trip will depend upon the weather conditions. Certainly she will not carry more than 16, this being the normal number required to man the ship.

Leaving Pulham

Since news was received of the completion of the hangar at Leningrad, where, according to plans, the airship should rest while equipment is being arranged at Spitzbergen for her, there was no reason for further delay at Pulham and, consequently, the Norge left there at 11:40 p.m. on April 13. The Norge was brought from the hangar at 11:05 p.m. About two hundred men of the district assisted in the operation. The airship was in position at 11:20 and released at 11:40. Searchlights played on her for a time and when last seen from Pulham she was traveling in the direction of Scole with practically a following wind.

The Norge carried sufficient provisions to last for five days, but it was expected that, if conditions held good, she would reach Oslo in 15 hr.

Wireless messages later reported the Norge well over the North Sea and on the way to Oslo. The Air Ministry in London reported that the Norge was going strong and that all was well aboard, but was unable to give the exact position. The British Air Ministry was again in touch with the Norge at 5:00 a.m. on April 14, and again at 6:45 a.m. and the reports of progress were favorable.

Norge Loses Way

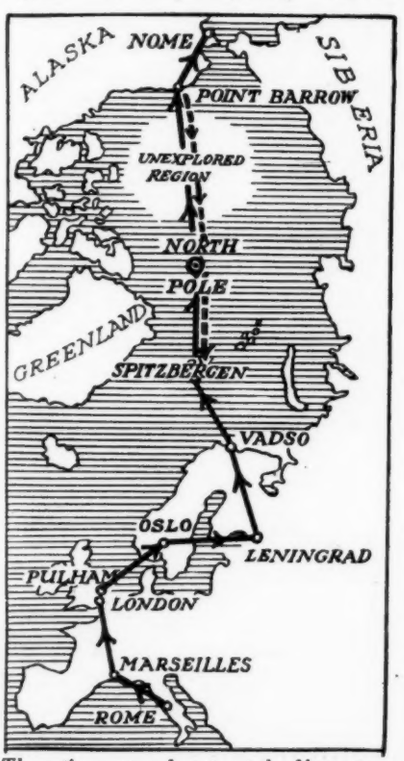
The course on leaving Pulham was set direct for Christainsand, Norway, but, after flying through the darkness of the night, the crew experienced some surprise on seeing land ahead at 6:30 a.m. the next morning. The West wind had driven the airship to the Southeast of its course and Norge was then over Nissum Lighthouse on Jutland, South of Limfjord. Fog, which had enveloped the ship during the night, was still bad. At 10:15 a.m. the coast of Norway was sighted at Torungen Lighthouse. From there, the coast was followed to Oslo. At about 4:00 p.m. a landing was made at the mast at Oslo, and refuelling and regasing operations were commenced immediately.

Hearing good weather reports from all points along the route to Leningrad, orders were given immediately for a departure that same night. Accordingly, the Norge left the mooring mast at Oslo at 1:05 a.m. on April 15, when a crowd of approximately 10,000 watched the departure in spite of the late hour. This was the first occasion on which an airship had been seen at Oslo.

The route to Leningrad was planned to pass over Stockholm thence direct to the Russian capital. At 12:30 p.m. on April 15, the Norge requested weather reports and bearings from the Sandhamn radio station near Helsingfors, and discovered that again it had lost its course and was due to cross Esthonia and not Finland, as had been the previous arrangement. She arrived at Esthonia at about 3:00 p.m. and, of necessity, missed out Stockholm as a result of the deviated course. After leaving Esthonia, the mist cleared and the railway line was followed to Leningrad. Crossing the Russian frontier at 5:10 p.m., Gatchina flying field, about 35 miles from Leningrad, was reached at about 5:40 p.m. Greenwich Time and a landing was effected at 7:30 p.m. The airship was immediately put away in the hangar, which has been constructed to receive it, and there it will remain until reports are received of the completion of arrangements for the accommodation of the airship at King's Bay.

The structure which is being built at Spitzbergen for the Norge is the largest wooden hangar in the world. It is 350 ft. long, 100 ft. wide and 100 ft. high. The Norwegian Government has employed eighty members of the Norwegian Navy and twenty coal miners, who, working by strong electric lights during the continuous darkness of Winter, are building the hangar.

The loading, equipping and testing of the Norge for its final dash across the Pole for Alaska may take two or three weeks. It was, therefore, essential to the success of the adventure to have adequate housing for the ship on its arrival at Spitzbergen. There is also in course, of erection at King's Bay, a mooring mast 110 ft. high, which must be completed before the Norge makes its flight from Russia.



The entire proposed route of the Norge from Italy into the Arctic

The flight from Leningrad to King's Bay will be made by as direct a course as possible. They will fly almost due North to Vardo, near Hammerfest, on the extreme northern coast of Norway. If wind and weather conditions are unfavorable to further flight, they will moor there. If flying conditions are favorable, Colonel Nobile will head for Spitzbergen. With good visibility, the flight to Spitzbergen may be easy. If fogs, strong winds and sudden and great changes in temperatures are encountered, the Norge may have a serious time. With its cruising range of 3,200 miles, however, the Norge could spend many hours, if necessary, in the hunt for Spitzbergen without being in danger of running out of fuel.

Once safely at Spitzbergen, preparations for the final flight will begin. When the ship's equipment is perfect, the explorers will rely on their meteorologists to guide them as to conditions ahead of them in the flight, 600 miles North to the top of the world and then 1,200 miles down on the other side to Point Barrow.

Details of the Airship

The Norge is 325 ft. long and has a cruising radius of 3,600 miles. It carries a Marconi wireless outfit having a radius of from 1,000 to 2,000 miles, and will send out bulletins of its flight over the Pole.

The Norge carries 30 tanks for fuel, each containing 67 gal., though weighing only a trifle over eleven pounds. The total contents of the fuel tanks are 2,000 gallons, or 13,000 pounds. Extra fuel is carried in tins. With this amount the airship can travel 65 hr. at a speed of 50 m.p.h., covering a distance of well over 3,000 miles.

The envelope of the airship is made of very strong 3-ply rubberized fabric. The keel is of steel tubing. The front part of the keel carries a shield-shaped structure, the purpose of which is to resist aerodynamic pressure on the envelope. The rear end of the keel supports a system of rings,

which carry the elevators and the rudder in such a way that the proper functioning of the tailplane and rudder is independent of the pressure of gas on the envelope.

From the control cabin it is possible to see the entire length of the keel. The whole length of the keel, from bow to stern, may be traversed on an extremely light corrugated duck walk resting on the lower steel tube of the keel, which is divided in two over the control cabin. At the bow of the airship an extremely light duralumin ladder permits access to the air valves and the top of the envelope.

Inside the keel are the 30 fuel tanks, with very light suspensions. Two longitudinal copper tubes carry the gasoline from the tanks and lead it to the engine nacelles. It is possible to transfer fuel from one tank to another in order to insure perfect equilibrium in the airship under all conditions.

There are three engine nacelles, two lateral and one at the stern in the center. They are suspended with steel cables from the keel, and each have room for one engineer, who is well protected from the wind. Each engine is fitted with a central radiator, which may be exposed in varying degrees to the wind by means of shutters and two lateral radiators, which can be removed.

These dismountable radiators are necessary in a temperate climate, but in the Polar regions are superfluous and can be left behind.

Oil tanks are in the engine nacelles with double walls and intermediate felt insulation to prevent the oil from freezing.

Valve Problems Cared For

The envelope does not present any special features, but the valves deserve special mention. The air valves of the ballonets are of specially light construction. Each exhaust valve has a special manifold for exhausting the air outside the keel, thus avoiding the danger of hydrogen finding its way inside the keel. The manifolds for admitting the air from the bow valve, into the ballonets are extremely light, lacking the usual framework. Their shape is insured by the stiffness of the fabric, and, during flight, by the air pressure.

Great care has been taken to prevent the formation of ice on the gas exhausting valves, which would cause them to freeze. The valves have been protected by semicylindrical shields, provided with windows, in order to render inspection of the valves at all times possible. The valve controls are automatic.

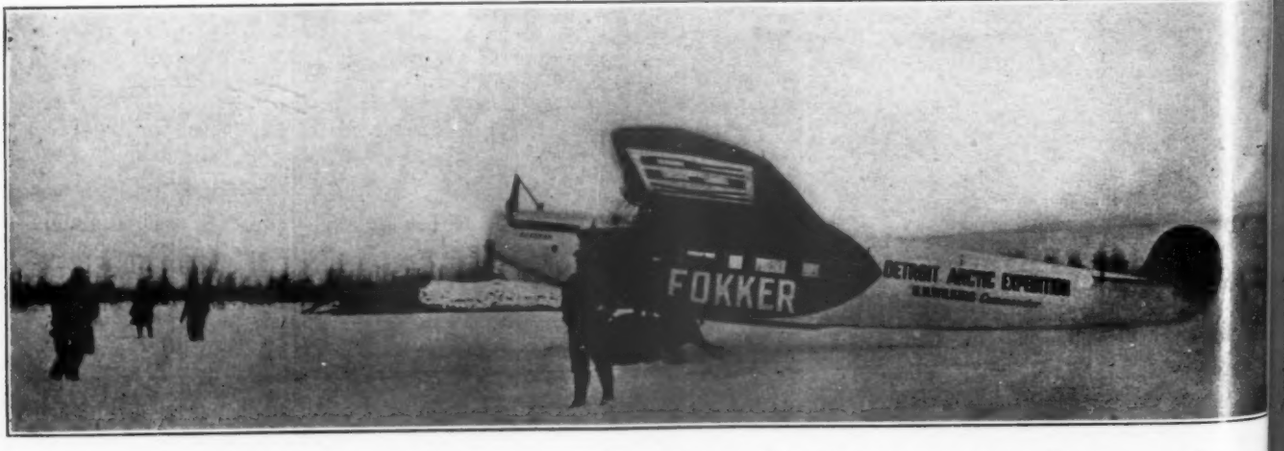
American Commercial Flying

Grand Total of 1925 Mileage Still Grows as More Reports are Received.

MILEAGE STATISTICS of commercial pilots collected during the past week total 217,755 miles, which, added to the past total, brings the grand total to 8,854,280 miles. These reports are still being sent in and it is hoped to publish additional figures next week.

The reports received during the past week follow:

State	*Mileage*	*State Total*
ARKANSAS		
O. N. Hogue	1,800	1,800
CALIFORNIA		
Leland B. Butt	5,000	5,000
ILLINOIS		
August Maross	3,600	3,600
INDIANA		
Chas. A. Blank	2,500	2,500
MINNESOTA		
Chas. W. Holman	35,000	35,000
MARYLAND		
Frank T. Dunn	20,000	20,000
NEW JERSEY		
Fred L. Wehrham	10,000	10,000
OHIO		
Harold K. Irish	19,200	19,200
OREGON		
J. G. "Tex" Rankin	19,500	19,500
PENNSYLVANIA		
Walter J. Shaffer	10,100	
Harold F. Pitcairn	8,550	
Lt. James G. Ray	12,780	
Henry Rafus	7,560	
W. Ben Faulkner	20,520	
Sterling Smith	1,860	
J. P. Lukens	1,225	
A. C. Gunther	2,660	65,255
WASHINGTON		
Vernon Bookwalter	9,300	
Earle N. Shahan	14,600	23,900
WISCONSIN		
John T. Jackson	12,000	12,000
		217,755



The Wilkins polar plane, Alaskan, leaving Fairbanks for a flight to Point Barrow with supplies

House Discusses Civil Aviation Bill

The House of Representatives Debates Parker Aviation Bill Prior to Taking Vote.

ON APRIL 12, the House of Representatives debated for three hours a bill (S.41) presented by Congressman Parker to encourage and regulate the use of aircraft in commerce, and for other purposes. The bill is practically identical with the Merritt Bill printed in AVIATION, March 22, and resembles the Winslow Bill of last year much more closely than it does the Bingham Bill, which passed the Senate in December. The full discussion can be obtained from the Congressional Record but our limited space only permits us to reprint such parts as seem especially important and which reflect the attitude of the House toward air regulations.

Mileage Statistics Brought Out

Mr. Parker, in his preliminary introduction of the bill, emphasized the importance of flying and made use of the figures of the miles flown by civilian pilots during 1925. He stated:

> "I have just received a letter this morning from AVIATION stating they have endeavored to find out how many miles had been flown by private aircraft during the last year. The statement is surprising. Over nine and a half million miles have been flown by private aircraft during the last year.
>
> "What we are trying to do by this bill is to make aviation safe so as to attract the public and the public's patronage, because, as a matter of national defense, every pilot you have on a commercial plane is a potential factor in time of war, because you have a trained pilot to use if an emergency ever arises."

Here Mr. King interrupted with a question:

> "I would like to ask the gentleman whether the committee has made any provision for protecting the people who are walking upon the earth. I notice they are bringing pianos every day down here to Washington from New York by airplane. It is a very fine plan and I am in favor of it, but some of us might get hit."

Mr. Parker replied that, after the enactment of the bill, the Secretary of Commerce would be empowered to supply the necessary protection. Mr. Parker cited the air mail as an example of the improvement in safety which could be brought about by proper regulation. In answer to a further question, he stated that the bill would require about $250,000. during the first year and that the present air mail service would be turned over to the Department of Commerce.

Against Bill

Mr. Blanton then put in a strong plea against the bill on the ground that it was putting aviation under the Department of Commerce, whereas he considered that there should be a Department of National Defense which should control all flying whether military or civilian.

Mr. Wainwright brought out that

> "The purpose of this measure is to foster and regulate civil air navigation, but I am afraid it lays more stress on regulation than on fostering; indeed, it provides for the regulation of something which, except for governmental activities, does not yet exist.
>
> "It provides a fairly elaborate structure or cage for these birds, with rules and conditions to regulate their flying; but I wonder whether it really will go far toward filling the air with flying machines as vehicles of our commerce and industry, as common carriers, in the same sense that we have carriers of persons and goods upon the sea and on the land."

Mr. Lea stated:

> "To begin with, we must consider this fact. We are going to have regulation of aviation and we are going to have regulation by 48 States of the Union or else we are going to have a uniform system of regulation by the Federal Government. It is far better that now, in the initial stages of aviation, when aviation is more or less an experiment, we should develop a system of law under which aviation may be developed, instead of attempting to make aviation readjust itself to conform to the law 20 or 30 years from now when the problem has become much more difficult than today.
>
> "In addition to that, practically everything that is in the bill is in the international air navigation convention as adopted at Prague in 1919. That convention was signed by representatives of the United States and has been ratified by leading progressive nations of the world. There is nothing new in the bill and there is much more in the air navigation convention than in this bill."

In reference to a question on inspection it was stated:

> "There is no specific time set for inspection, and there is no limit on the number of inspectors or provisions as to how many there will be. It will not be the inspector who would chase up the airplane. An airplane will be prevented from operating without an inspection after a certain date."

A Matter of Constitutional Right

The longest and most complicated part of the debate was concerning the constitutional right of Congress to pass an act regulating intrastate flying. Legal aspects and precedents were cited but an amendment to exclude intrastate flying from the regulation was finally defeated. The bill passed by a vote of 229 to 80 and was referred to a committee of three Senators and Congressman so that they might reconcile the difference between the Senate and House bills so as to enable a uniform bill to be passed by both branches of the legislature.

Many of the points brought out by pilots in their letters about legislation were discussed but many matters, which are of vital importance to the fliers, were not touched upon. On the other hand, the Congressmen were attacking the problem from the point of view of the general public as well as from that of the fliers and emphasized points which were not touched by the pilots. There was much apparently irrelevent discussion and quite naturally the goodwill of many of the Congressmen was greater than their knowledge of the subject but the members of the committee who framed the bill had evidently put much time and thought into the subject.

Model and Full-Scale Propeller Tests

A report has recently been published by the National Advisory Committee for Aeronautics, entitled, "Comparison of Tests on Airplane Propellers in Flight with Wind Tunnel Model Tests on Similar Forms," by W. F. Durand and E. P. Lesley.

The purpose of this investigation was to determine the performance, characteristics, and coefficients of full-sized air propellers in flight and to compare these results with those derived from wind-tunnel tests on reduced scale models of similar geometrical form.

The full-scale equipment comprised five propellers in combination with a VE-7 airplane and Wright E-4 engine. This part of the work was carried out at the Langley Memorial Aeronautical Laboratory, between May 1 and Aug. 24, 1924, and was under the immediate charge of Mr. Lesley. The model or wind-tunnel part of the investigation was carried out at the aerodynamic laboratory of Stanford University and was under the immediate charge of Doctor Durand.

A comparison of the curves for full-scale results with those derived from the model tests shows that while the efficiencies realized in flight are close to those derived from model tests, both thrust developed and power absorbed in flight are from 6 to 10 per cent greater than would be expected from the results of model tests.

A copy of the report, No. 220, may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.

Airship Los Angeles again takes the Air

The Naval Airship Los Angeles, made a short cross-country flight on April 14, this being the second flight which had been made since the ship had undergone an extended and

Lieut. Comdr. Chas. E. Rosendahl

thorough overhaul during the past Winter. The previous flight was made on April 12. The flight lasted but 2 hr. and the airship was commanded by Lieut. Comdr. Charles E. Rosendahl, who has succeeded Capt. George Steel in this command. Forty-nine men were on board the Los Angeles when she left her mooring mast at Lakehurst at 2:14 p.m. The ship cruised over Point Pleasant and Asbury Park and returned to Lakehurst shortly after 4:00 p.m. and landed at 4:35 p.m. with the entire station force of 300 men pulling her down and taking her into the hangar.

New Commercial Air Routes Planned in Italy

It is reported that the new commercial air line between Genoa, Rome, Naples and Palermo, will shortly be opened. Tests of the possibilities of air navigation over this route have been made and have been reported as satisfactory.

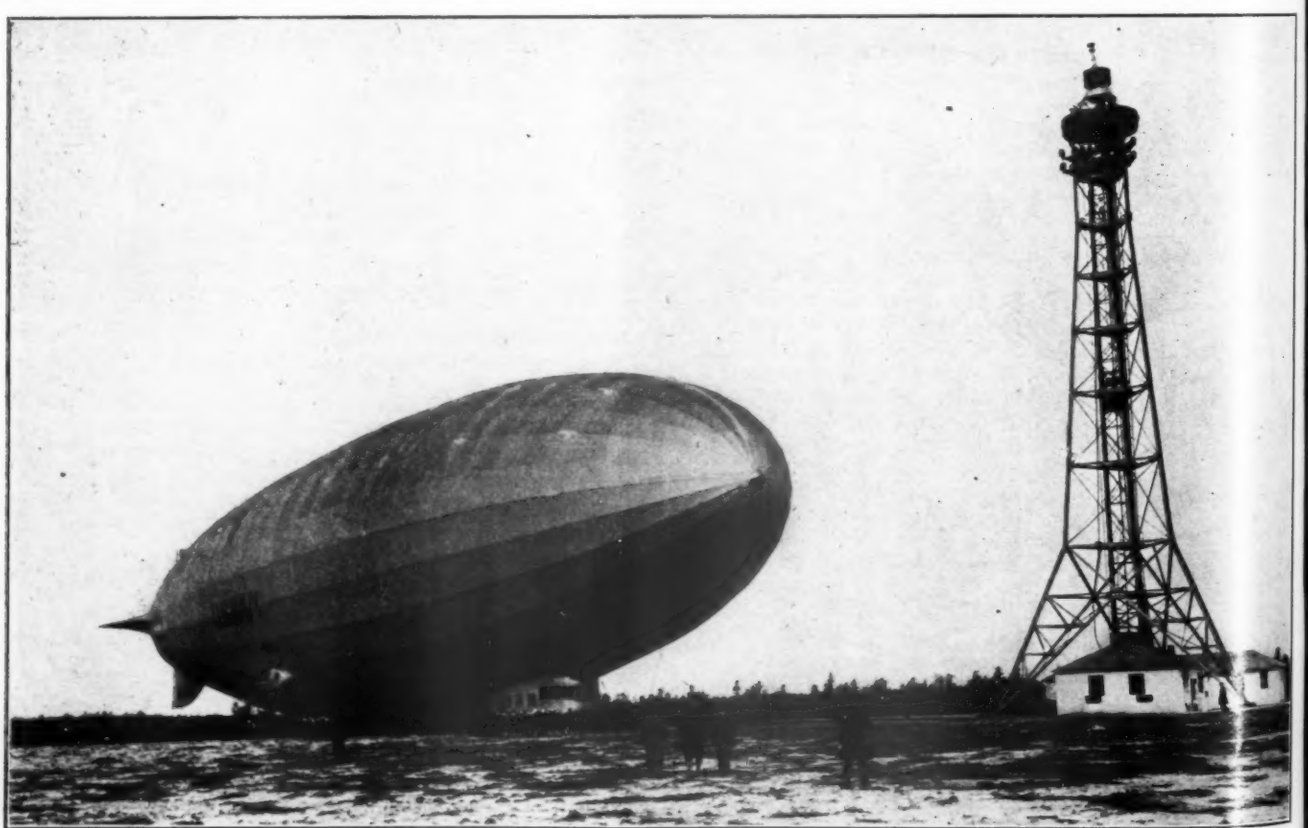
In accordance with the present plans, during the first month of operation the departures will be twice a week; in the second month, it is anticipated that there will be three bookings each week, and in the third month, the service will be daily. To cover the cities in this route, eight hours will be necessary. This will permit half-hour stops at Rome and Naples. The trip from Genoa to Rome is expected to take 3 hr., Rome to Naples, 1 hr., and Naples to Palermo 2 hr. The machines are scheduled to leave Genoa at 7:00 a. m. and the schedule calls for their arrival at Palermo at 3:00 p. m.

The present equipment admits the carrying of eleven passengers, and, in case eleven through passengers from Genoa to Palermo are not available, local traffic between the intermediate ports will be permitted.

The cost of this transportation will be the ordinary first class railroad fare, plus 50 lire. In view of the shortening of the time involved for the trip and the fact that this air transportation will do away with the necessity of meals and sleeping car advantages, it is expected in Italy that air travel will be really economical.

Plans are also reported for the opening of another line called the Northern line which would start at Turin, touching Padua and Venice, and end at Trieste.

This trip would call for a flight of 4 hr. During the first month, sailings are to be bi-weekly and the second month three times a week, installing a daily service in the third month as in the Genoa-Palermo route.



The Los Angeles held down by the landing party just prior to being attached to the mooring mast at Lakehurst, N. J.

On Fuels For Aircraft Engines

The Importance of Using Good Fuel in Airplane Engines Cannot be Over Emphasized.

WITH THE extended and increasing use of the Wright Whirlwind radial air-cooled engine for commercial purposes, it is of very first importance that every attention and care should be given to certain fine points in maintenance upon which success lies. Very excellent results, from the standpoint of reliability in operation, have been obtained in the use of the Whirlwind engine in both Naval and commercial airplanes and, since the use of this type of engine is still extending rapidly, it seems wise to take this opportunity of discussing what is probably one of the most important features requiring attention from the standpoint of reliability.

Reliable though an airplane engine may be, it is always reasonable that, to obtain the full measure of this reliability, every attention should be given to certain stipulated requirements laid down by the manufacturers of the particular engine in question. One of the most emphatic requirements which almost any manufacturer of engines will state is that gasoline of the best quality be used exclusively in the running of the engine. A booklet is issued by the Wright Aeronautical Corp. relating to the operation of Wright engines and, in this, there appears a special section on the correct fuel to be employed for obtaining the best results.

Inferior Fuel Leads to Trouble

If the stipulations laid down were particularly stringent, there might be some excuse for a certain amount of laxity on the part of operators, but since the best advice that the Whirlwind manufacturers can offer on this question of fuel, is that ordinary domestic aviation gasoline or its equivalent be used exclusively in the engine, there can never be any excuse for neglect in this respect. The Wright Whirlwind engine is specifically designed to run on domestic aviation gasoline, commonly known as high-test gasoline, and the compression ration is considerably too high to allow satisfactory running with common commercial or automobile gasoline. The use of inferior fuels such as commercial gasoline, leads to overheating of the cylinders and, consequently, to a great reduction in the life of the cylinders, pistons and valves. The reliability and durability of the engine, which is of the very first order when correct fuel is used, will very naturally be considerably reduced by the use of inferior gasoline.

Poor Gasoline Reduces Power

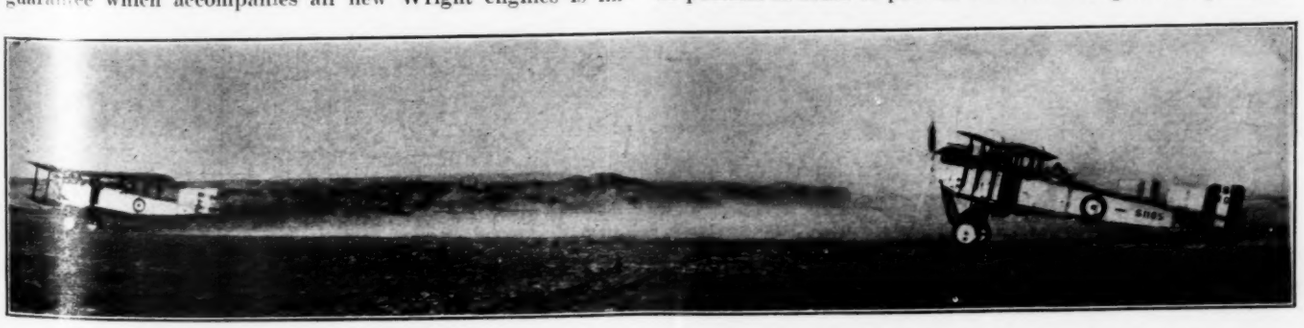
The use of inferior fuel also means hard starting and oil dilution with the consequent danger of scoring cylinders, piston rings and pistons. The power output is reduced and the tendency to detonation greatly increased. The importance of these points cannot be over-emphasized and every commercial user of Whirlwind engines, or any other engine for that matter, should give careful attention to his gasoline supply to see that it meets the requirements of reliable operation, which, in the long run, means all that there is to economy and success. When it is realized that the excellent guarantee which accompanies all new Wright engines is immediately rendered nul and void as soon as the engine is run on commercial or other inferior fuel, the real importance of this problem will be even further recognized.

Quality Tests For Gasoline

Elaborating upon this question of the correct fuel for aircraft engines, the following note extracted from the Wright engine instruction book, contains some valuable advice:

> Wright aircraft engines are designed for use with domestic aviation gasoline or its equivalent, and the use of any inferior fuel voids our guarantee. All Wright engines are tested at the factory with domestic aviation gasoline which has been analyzed and tested to meet Navy specification 7G1B for grade B domestic aviation gasoline. Commercial flying concerns using gasoline in considerable quantities are advised to insist on a gasoline equal in quality to this specification, which may be determined by subjecting gasoline samples from every lot purchased to a number of tests in which they should meet the following specifications:
>
> 1. Free from water and suspended matter.
> 2. Color not darker than No. 25 Saybolt.
> 3. Negative doctor test.
> 4. No gray or black corrosion from 100 cc. sample and not more than 3 mg. deposit when evaporated in a polished copper dish.
> 5. Distillation range temperature limits:—
>   - a. At recovery of 5% of sample— 75°C (167°F) to 50°C (122°F)
>   - b. At recovery of 50% of sample—not more than 105°C (221°F)
>   - c. At recovery of 90% of sample—not more than 155°C (311°F)
>   - d. At recovery of 96% of sample—not more than 175°C (347°F)
>
>   At least 96% shall be recovered as distillate.
>
>   When residue in flask is cooled and added to distillate, loss shall not exceed 2%.
> 6. No acid reaction of residue in flask at completion of distillation.
> 7. Not over 0.10% sulphur in sample.
>
> There is no objection to a use of a good quality of benzol to suppress the detonation in gasolines which have a tendency to produce detonation.

Of course, it is perfectly possible to design an engine which would run on automobile gasoline, but the average operator would not be pleased with the power output, either in relation to weight or to the overall dimensions of the engine. Furthermore, there is no good reason for using commercial gasoline in aircraft engines at this time, and the best advice suggests that it be always avoided. If however, under peculiarly adverse circumstances, when emergency is in the extreme and commercial gasoline is all that is available, the user should most certainly fly with the engine continually throttled as far as possible in order to prevent the overheating of the cylinders.



The start of the British Royal Air Force flight from Cairo to Capetown. Fairey 3D airplanes leaving Heliopolis airdrome.

Aeronautical Work at M.I.T.

Aeronautics Course at the Massachusetts Institute of Technology Covers all Fields. Extensive Research and Test Work also Carried out.

A REGULAR UNDERGRADUATE course in aeronautical engineering, leading to the degree of Bachelor of Science in that subject, has just been initiated at the Massachusetts Institute of Technology by vote of the Institute authorities. A sixteenth course is thus added to the fifteen in various branches of engineering and science which the Institute already offered, and a new opportunity is offered to students desiring to prepare themselves for technical work in the aeronautical industry or for aeronautical research.

Undergraduate Opportunities

Although the graduate course in aeronautical engineering at M. I. T. has been well known for more than twelve years and its graduates are holding important positions in the industry and in the Government service, it has not been generally appreciated that there are opportunities for undergraduate work in aeronautical engineering, as well. The course was primarily for graduates and was kept so by deliberate intent, the establishment of an undergraduate curriculum having been considered at intervals ever since 1919, and always rejected because the need seemed to be for a few highly trained men rather than for a large number of graduates of a briefer course. At all times, however, properly qualified undergraduates have been able to take the aeronautical subjects as electives in their senior year, registering in and receiving a degree from the course in general engineering, and some twenty undergraduates have taken the full course in airplane design as such an elective subject in the last four years. Now, the promise of steady growth of importance of commercial aviation has led the head of the aeronautical course at M. I. T. to recommend the inclusion in the catalog of a regular list of studies required for an aeronautical degree, and the recommendation has been accepted.

The work of the first two years for the aeronautical students will be very much like that for mechanical engineers. In the third year one or two aeronautical subjects will be included, especially a course in theoretical aerodynamics and one in rigging and practical maintenance work, according to present plans. The senior year will be devoted almost entirely to aeronautical work on airplane design and production methods, wind tunnel research, and airships and propellers, and each student will carry through an original piece of work, either a research in the wind tunnel, a laboratory study of some aircraft material on which insufficient data are at present available for engineers, or something else of that nature.

The steady growth of interest in aeronautical engineering education at M. I. T. is evidenced by the presence of thirteen civilian students in the course in airplane design—a course offered, as already noted, primarily for graduates. As Army and Navy officers are also detailed for aeronautical work, and as the course in airplane design is taken by all the naval constructors in the graduate year of their study at the Institute, the total number enrolled during the present year was about thirty.

Inspection Tour in the Industry

During the brief vacation period immediately following the mid-year examinations, the academic work was supplemented by an optional tour of inspection of aeronautical points of interest in the Eastern states. Through the generous co-operation of the industry and of Government departments, it was possible to cover a great deal of ground in a few days, the Curtiss, Loening, Wright, Atlantic Aircraft, Sikorsky and Huff-Daland plants being among those visited, together with the Naval Aircraft Factory and the laboratory of the National Advisory Committee at Langley Field. Six civilian students made the whole tour and others joined the party for some of the factory visits, to bring the maximum number up to twelve. The interest displayed was so great that it is probable that such a trip will be an annual feature hereafter.

A general view of the small M.I.T. wind tunnel seen from the fan end. Since this photograph was taken all electric cables carrying current to the driving motor have been installed underground.

The equipment of the Massachusetts Institute of Technology for the carrying out of aerodynamical research and test work consists, in the main, of two wind tunnels. These tunnels are both of the circular section Venturi type and are similar in most respects, one, however, being considerably larger than the other. The smaller of the two, built some years ago, is 4 ft. in sectional diameter at the working section which is parallel for 6 ft. The air stream is set up by a four-blade fan of 7 ft. 6 in. diameter, chain driven by an electric motor of 17 hp. (designed.)

The bell-mouth intake rapidly diminishes from a diameter of 9 ft. 6 in. to the parallel portion, in a curved taper, while the exit is of conical form, 24 ft. 6 in. long, terminating at the fan end in a diameter of 7 ft. 9¾ in. A honeycomb is installed and this is composed of metal tubes 3 in. in diameter and 12 in. long and placed immediately before the parallel portion of the tunnel. Since these tubes are cylindrical, they do not fit the taper of the entrance cone exactly. This honeycomb serves the purpose of straightening any swirl which might otherwise exist in the air stream as a result of the rotation of the fan.

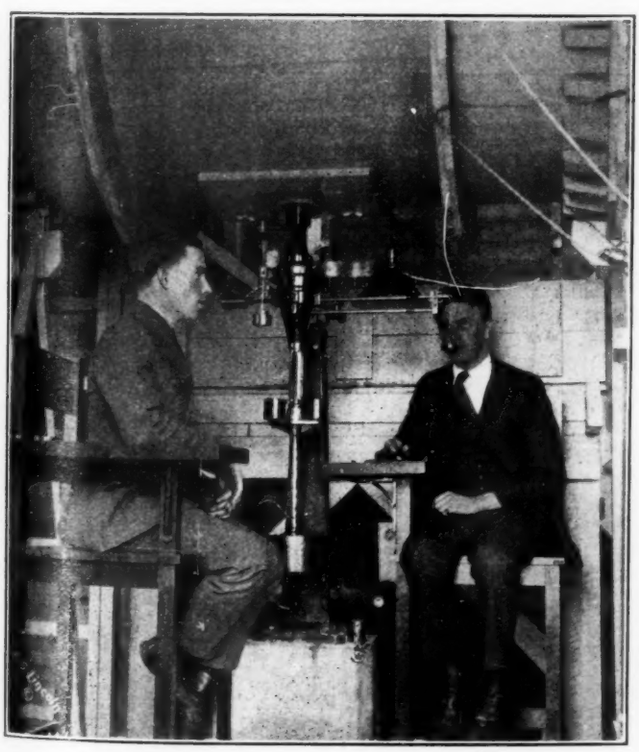
Two platforms are arranged around the tunnel, one over the top and the other at the side. The latter gives access to the interior of the tunnel by means of a window hinged along its upper edge.

Measurements of forces upon models supported in the air stream are made by means of a standard N.P.L. type balance. The maximum wind speed obtainable in this tunnel is 60 m.p.h. at 715 r.p.m. of the fan. At this speed the electric motor develops 14 hp.

There is also in use in this tunnel a roof balance for the measurement of rolling and pitching moments on models in the wind stream, the model being, in this case, suspended in the tunnel by a system of wires.

The Large Wind Tunnel

The large tunnel was built more recently. As has been previously stated, this tunnel is similar in design to its predecessor. The diameter of the working section, which is parallel for 15 ft., is 7 ft. 6 in. The entrance cone, similar to that of the small tunnel, is 15 ft. in diameter and 20 ft. long. The honeycomb is made up of tapered tubes 3 in. in maximum diameter and 14 in. long and placed 11 ft. 3 in. forward of the parallel portion. Since tapered tubes have been used, this honeycomb approximately fits the walls of the curved entrance cone. The exit cone, which is 46 ft. long, has a constant slope of 4 deg., its terminal diameter at the fan being 14 ft. 3 in. An electric motor of 98 hp. drives, direct through a shaft, the four-blade fan, the diameter of which is 14 ft. The maximum air speed obtainable in this tunnel is 90 m.p.h.



The N.P.L. type balance in the small M.I.T. tunnel in operation

The original balance arranged for measurements in the large tunnel was rigged on a firm bench on the overhead platform which is supported by concrete pillars direct from the stone flooring, thereby minimizing vibration. The balance was of the all-wire suspension type and similar to that employed by Dr. Prandtl at Göttingen. Reference to the diagram will make the arrangement clear.

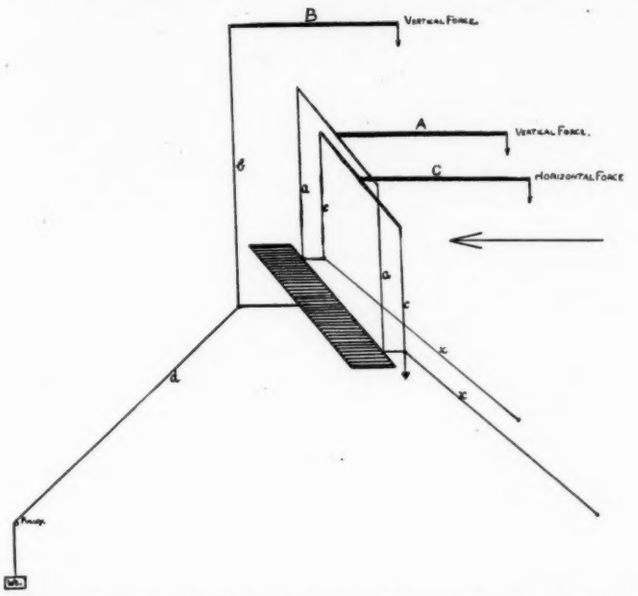


Diagram illustrating method of force and moment measurements in the large M.I.T. tunnel

Force Measurements

The sum of the tensions in the wires a, a, measured on A balance and b, measured on B balance, is the total vertical force on the model, in this case an airfoil. The balance B also reads a moment about the leading edge of the model. The drag of the model is measured as the vertical component of two forces, one, the true horizontal force acting down stream, and the other, the reaction set up in the wires x, x arranged at 45 deg. and secured to the floor of the tunnel. The tension in c, c, is, therefore, a measure of the horizontal force on the model and is measured on the balance C. A calibration, of course, is necessary. The purpose of the wire d, is to carry a weight outside the tunnel over a small pulley in order always to maintain tension in the 45 deg. wires.

Rolling moments can be measured by locking balance A and reading a difference in tension between the two wires a, a, a suitable balance arm being fitted which permits the cross arm of the balance to swing in the right-angle plane.

Additional Apparatus

Other types of aerodynamic balances have been designed and constructed for use in the large wind tunnel for specialized classes of experimental and research work. In addition to the student instruction and thesis work which is carried on in the aerodynamic laboratory, a very considerable amount of research work and test work is done in a wide variety of subjects involving all branches of aeronautics and aerodynamics, whether applied to the airplane, airship, helicopter, or in other fields in which aerodynamical theory is applicable.

All aeronautical instruction and all research and experimental test work carried out in the Department of Aeronautics at the Massachusetts Institute of Technology is under the direction and supervision of Professor Edward P. Warner.

Convertible Monoplane–Biplane Wings

Interesting Wind Tunnel Experiments on the Possibilities of Compound Wings.

By RANDOLPH F. HALL

MANY ATTEMPTS have been made to develop experimental wings in order to improve the airplane's performance. Unqualified success, however, has not been realized in a departure from the usual trend and the conventional wing survives.

A line of wing development has been followed by the writer which has proved interesting and encouraging. In this development an efficient and relatively deep section monoplane wing of high speed and climb characteristics is convertible into a biplane to obtain an increased lift for slow speed performance. The principle was described in an article entitled, "Possible Lines of Aeronautical Development", which appeared in the February 15 issue of AVIATION.

Inefficient Gap/Chord Ratios

While it is true that biplane wings of small gap/chord ratio are very inefficient at low angles of incidence, the condition improves considerably for high incident angles and a large per cent increase over a single wing of similar dimensions is obtainable. This is evident from Fig. 4, showing biplane Ky (lift coefficient) corrections for varying gap/chord ratios of a typical wing at high incidence. The slope at low angles has been assumed but the curve appears reasonable. From this curve, for a gap/chord ratio .15, a fifty per cent increase in lift over a single surface might be expected.

Highly efficient deep streamline sections have been produced but their maximum lift value has not been superior to thin airfoils for comparative purposes. With the exception of their adaptability to cantilever and internal construction, no improvement is gained unless it is possible to use the additional depth advantageously, as, for instance, where a convertible wing is employed to obtain greater lift with the corresponding minimum speed qualification. An increase in

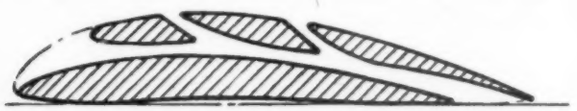


FIG. 1 EXPERIMENTAL WING NO. 1

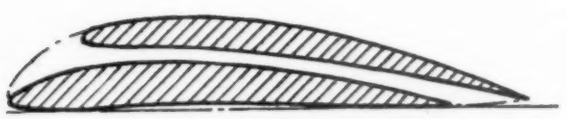


FIG. 2 EXPERIMENTAL WING NO. 2

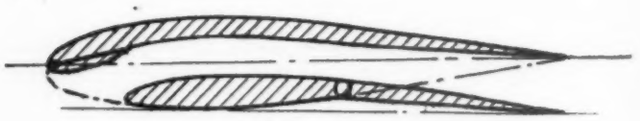


FIG. 3 BIPLANE WING NO. 3

resistance for this condition would, in view of the surplus power at minimum speeds, be of little consequence, although tests indicate that, at high angles, the resistance of low gap/chord biplanes is normal.

In addition to the convertible feature, the incorporation of slots communicating with the passageway between the wings may be found to further improve the performance. Slots, in all probability should function in the manner of the Handley Page type, by feeding air above the sections. The reverse procedure, that of displacing air from above by venturi action has been attempted and discarded. Fig. 1 shows the wing tested and in Fig. 5 the results are plotted. That these slots were detrimental may be observed from tests of the wing of

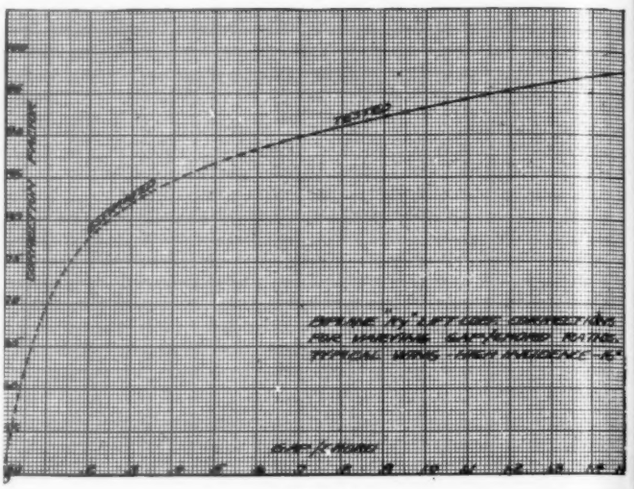


Fig. 4.

Fig. 2 and the second curve of Fig. 5, although the maximum lift fell off at a lower angle. The passageway was very narrow and the resistance must have been high.

The only complete test of the convertible wing has been made upon the wing of Fig. 3, the base section of which is Göttingen 410. The curves of Fig. 6 relate to this section and Fig. 7 discloses the characteristic curves for the wing as a biplane. These tests are not absolutely comparable because

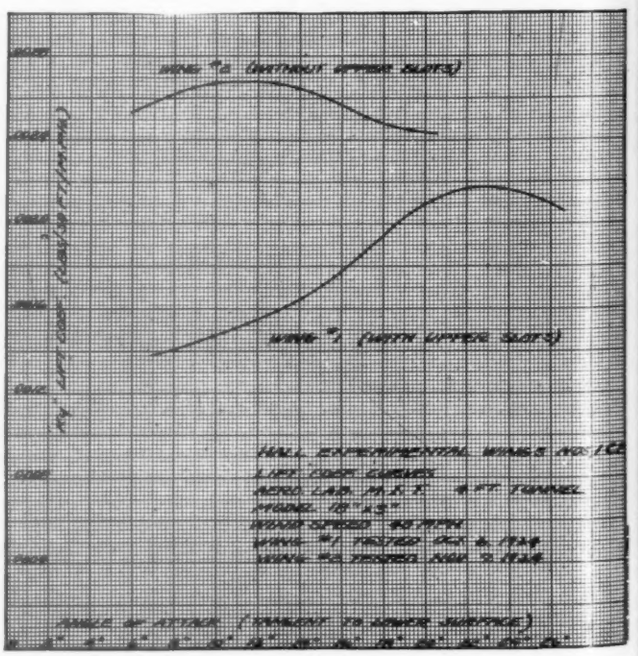


Fig. 5.

of the tunnel and aspect ratio differences but are sufficient for ordinary comparison. The wings of the converted biplane model were of the usual laminated wood construction and were joined by thin brass plates running parallel to the chord

between the airfoils, the gap being about half the depth of the whole combination. The maximum lift of this model is 0.00405 at 18 deg. incidence. The L/D values at high incidence are normal, insuring the usual gliding angle. The center of pressure at high incidence is at 34% of the chord from the leading edge, which is not far from the C.P. position of the base section. This advantage is most apparent in the structural design of the wing and in considerations of equilibrium.

Speed Range Possibilities

A comparison of the characteristics of this wing with several other well known airfoils is given in Table 1. While weight and simplicity are factors to receive cognizance, the wing in question is not seriously involved. The single leading edge and trailing edge flap controls need be no more than the ordinary aileron control. Certainly torque tube operation of the rear flap, which, by means of inter-connections, actuates the nose flap, can hardly be termed excessively complex and unreliable. An airplane mounting this wing could be expected to possess a greater speed range than the one with the usual wing, without sacrifice in other performance. The exact increase would depend upon the class of airplane. Ordinarily the increase would be at both minimum and maximum ends of the velocity scale, although, in comparison with very efficient high speed thin wing designs, the increase would be at the lower end only where it is most needed and where it might mean the difference between large and small landing fields and specialized and average pilots. From the examples of Table 1 it follows that the landing speed unit reduction

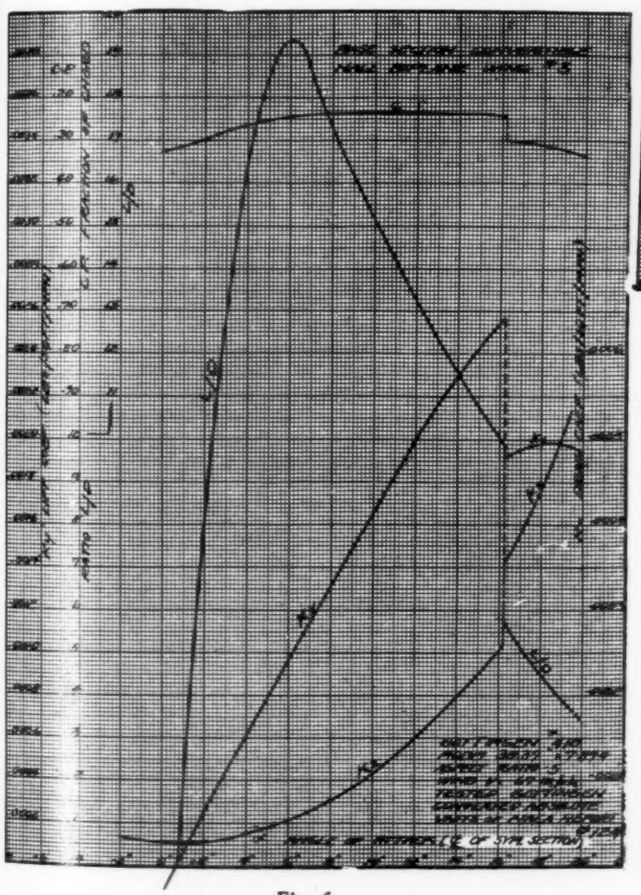


Fig. 6.

is greater for high speed planes. The 18 m.p.h. difference between the convertible wing and the Sloane airfoil is worth while.

The lateral control of a convertible monoplane biplane wing airplane may be accomplished in several ways. It may be incorporated as a part of the passageway control or separate ailerons may be provided. The latter may be located independently of the convertible portion of the wing or secured as an over-hanging trailing edge portion of the upper airfoil.

The proposed convertible wing has been criticized. The arrangement is admitted to be aerodynamically sound and the wing tested, is acknowledged to be possessive of excellent characteristics. A broad statement that it is structurally

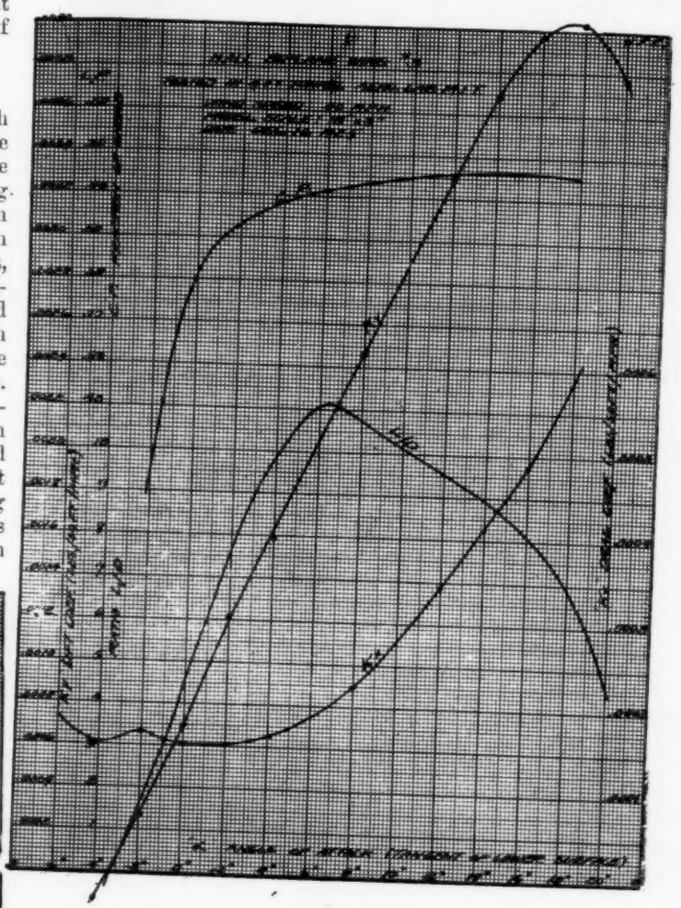


Fig. 7.

impractical is considered unjustified. Is it not rather doubtful at present what constitutes limitations of practical design? The wing differs from the class of variable camber arrangements, in that the truss elements are fixed and rigid. The only addition to an ordinary biplane is the narrow nose flap which is not complex. Direct torque tube control is one of the simplest forms of lateral control. The inference that supports between the two airfoils will destroy the aerodynamic properties bears no weight. Supports existed in the model tested. Profile deformation is no more likely to occur than in any wing with ailerons.

Comparison with slotted and adjustable flap wings should be made upon an applicable basis. Percentage increase in lift by a device is of no actual importance unless the maximum lift is considerably greater than that obtained by an ordinary wing. Otherwise the purpose of providing a lower landing speed is defeated. Obviously, to create from something inferior, something normal, even though possibly a high percentage variation, is not necessarily an improvement. The ratio of maximum lift with the device to minimum drag obtainable is only a hypothetical consideration and not a comparable value for different wings. True comparison should be made between the ratio of desired Ky values of wings in flight arrangement and the corresponding Kx values for these Ky values. The selection of a particularly advantageous characteristic from each of a number of independent wings cannot be fairly cited against one wing.

Subsequent tunnel tests of the Hall No. 3 Convertible Monoplane-Biplane wing with a 3/32 in. slot in the upper surface, directly to the rear of the forward flap and parallel to the leading edge and a 1/16 in. aileron type slot in the

lower airfoil at the rear flap hinge, have resulted in little change in the characteristic curves of the model. The maximum lift coefficient remained practically the same, although the Ky curve slope was reduced slightly and the maximum L/D value was less. The C.P. forward position moved back 6% from its previous location without slots.

Slot Possibilities

The conclusion drawn is that the slots were poorly arranged, a fact substantiated by a study of Handley Page's early experiments (reference is made to his first wing with slots parallel to the L.E.) and that the passageway opening was insufficient to feed both the passageway and the upper slot. While an analysis of this test, therefore, does not show the possible benefit of properly arranged slots for this type of wing, and further tests will be made to verify the fact; an improvement in the wing design has been suggested which would appear to eliminate the necessity of slots. Except for the front or leading edge member, the upper airfoil could be substantially without thickness, the top covering of the actual wing preferably constructed of plywood or metal sheet, constituting both its upper and lower surface. In this manner the lift will be materially improved by the increase in depth of the passageway of about 33%. The fixed part of the lower wing would constitute the rear beam.

The combination would not be more complicated nor heavier than an ordinary wing. It would even appear possible to eliminate the nose flap by locating the passageway opening to the rear and under the leading edge of the wing. The rear flap could be automatically held by tension from above which would hold the flap closed at low incidence but which would permit its opening at high incidence, by the pressure of air in the passageway.

TABLE I

Comparison of Convertible Wing with Others

Ref.	Description	Hall No. 3 Convertible	Götting 410	Sloane	R.A.F. 15	U.S.A. 27	Clark Y	Remarks
1	Max. Ky lb./sq. ft./m.p.h.	.00405	.00255	.00238	.00265	.00346	.00318	Hall No. 3 open has 59% increase in lift over Götting 410, close base sec.
2	L/D at .0003	9.8	9.8	7.8	7.5	4	8	Hall No. 3 closed. Indication of very high speed efficiency.
3	L/D at .0005	14.5	14.5	13.6	12	9	12.7	Hall No. 3 closed. Indication of normal high speed efficiency.
4	Max. L/D	19.4	19.4	22.8	17.3	18.6	21	Hall No. 3 closed. Indication of climbing ability.
5	C.P. travel	23.5-34	23.5-27	30-51	24-40	29-68	31-64	Hall No. 3 open = 33.5 range corresponds from Ky = .0005 forward.
6	Example landing speed	55	70	73	69	60	63	Example: area = 200 sq. ft. monoplane, wt. = 2500 lb.
7	Example landing speed	43	54	56	53	47	49	Example: area = 400 sq. ft. monoplane, wt. = 3000 lb.

Note: Models of above airfoils were tested with aspect ratio of 6, except Göttingen 410, the aspect of which was 5. Values for this section, which is the base for the convertible wing, are, therefore, under rated upon a comparative basis.

Hisso Engines Available

J. L. Schroeder of Houston, Tex. has secured a quantity of the Model "A" Hisso engines offered by the government, recently. Mr. Schroeder states that a limited number of these will be offered at a small margin of profit. These engines are complete, less hub, and crated for shipment. They have been slightly used, he says, but with a few adjustments and little expense will offer practically the same service as new ones. Engines will be shipped subject to inspection.

New Equipment for Varney Air Mail Service

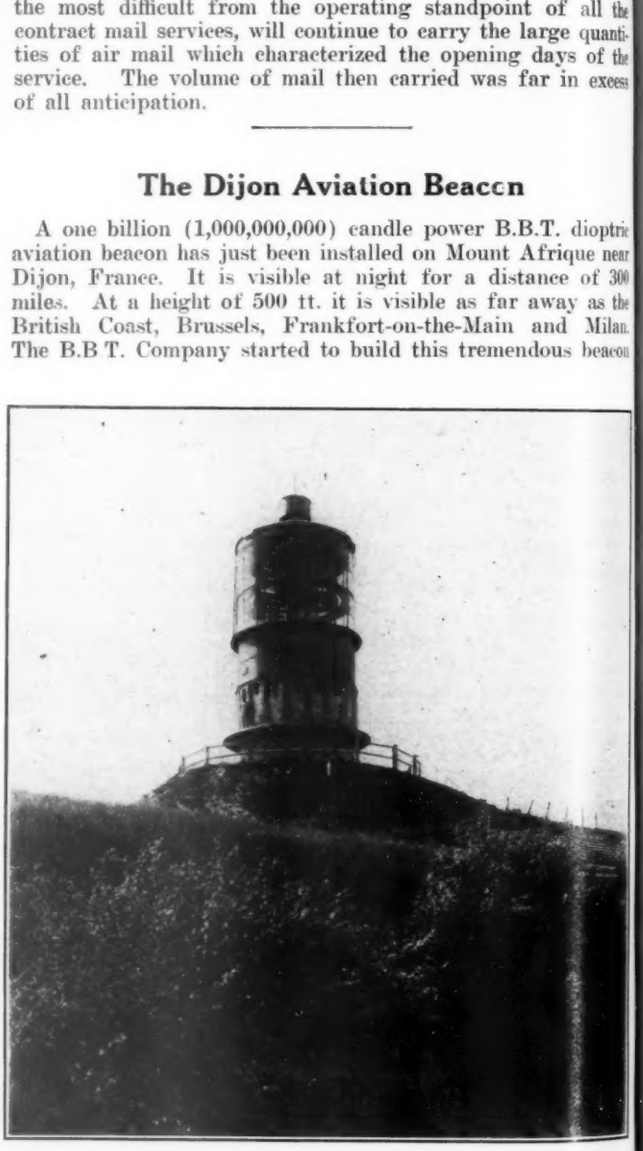
The Elko, Nev., to Pasco, Wash., contract air mail service operated under contract by Walter T. Varney, opened on April 6. After successfully operating for two or three days over this extremely difficult route which entails the passage of the planes over some of the most difficult flying terrain in the country it was decided that more powerful engines would be needed in the mail planes. Accordingly, the service has been temporarily suspended, the Post Office Department granting such a suspension for a period of sixty days, while the new engines are being installed in the Swallow mail planes which were previously equipped with Curtiss C6 engines.

The new engines which are to be installed are Wright Whirlwinds, and, by the time this note is read, these will probably have arrived in the West from Paterson, N. J.

It is fully anticipated that the mail service will be resumed within the next three weeks when this route, which is one of the most difficult from the operating standpoint of all the contract mail services, will continue to carry the large quantities of air mail which characterized the opening days of the service. The volume of mail then carried was far in excess of all anticipation.

The Dijon Aviation Beacon

A one billion (1,000,000,000) candle power B.B.T. dioptric aviation beacon has just been installed on Mount Afrique near Dijon, France. It is visible at night for a distance of 300 miles. At a height of 500 ft. it is visible as far away as the British Coast, Brussels, Frankfort-on-the-Main and Milan. The B.B.T. Company started to build this tremendous beacon



The Mount Afrique, Dijon aviation beacon

in 1918 to insure the return of the night bombing squadrons during the War but the Armistice delayed its completion. It has now been installed primarily to facilitate night travel on the Paris-Marseilles air line, and also to point the way for the numerous passenger, mail and express planes which are weaving a network of air routes over France. The beacon is said to be the most powerful light in the world.

German Air Transport Reorganized

Junkers-Aero Lloyd Combine Effected and Air Transport in Germany Again Operative. Country is Served With Widespread System of Air Lines.

GERMAN AIR traffic was resumed on April 6, by the new single company, the Deutsche Lufthansa A.G., which has been formed out of the two companies which were running the German airways last year, the Junkers Luftverkehr A.G. and the Deutscher Aero Lloyd A.G.

A week was devoted to the introduction of the new company to the public through visits to the Tempelhofer Feld airdrome arranged for the Press and for municipal and other authorities. The Tempelhofer Feld is the airport of Berlin.

The New Udet Plane

The most interesting exhibit was the new four-engine Udet Kondor, which flew from Munich to Berlin recently in 3 hr. 15 min. The Udet firm has hitherto devoted itself mainly to light aircraft, and has figured prominently in flying competitions. The Kondor, its first important experiment in the construction of commercial aircraft, is an interesting example of the influence of the Allied restrictions on German construction. It is fitted with four 100 hp. Siemens S. H. engines, carries eight or nine passengers, and can cover the distance between Munich and Berlin in just over three hours, yet its specifications fall, it is claimed, within the limits of the restrictions.

A flight over Berlin in a three-engine all-metal Junkers machine is distinctly more comfortable than the short drive to the airdrome in one of the Lufthansa's latest motor omnibuses.

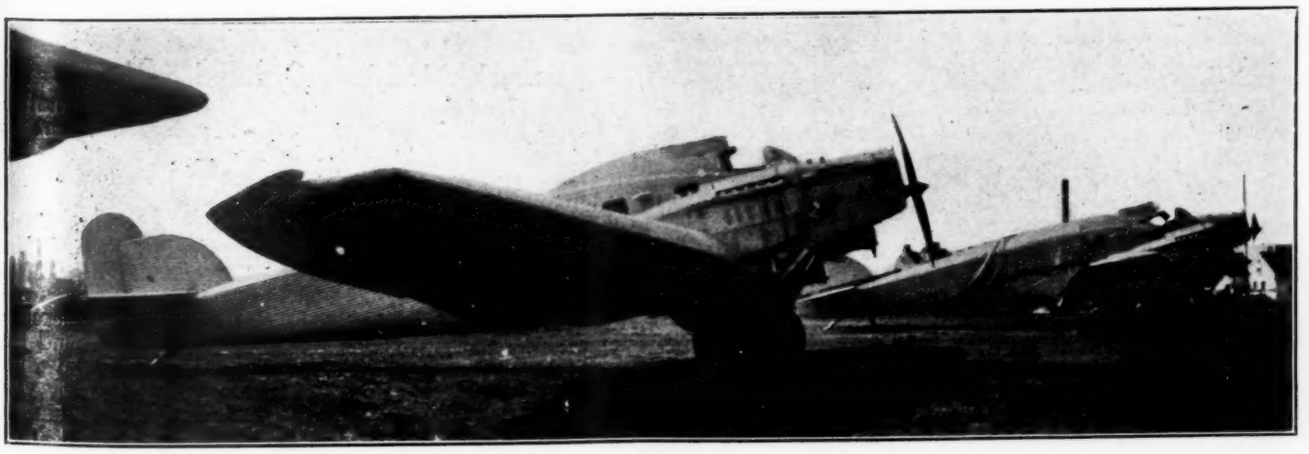
Airport Arrangements

During the three months in which flying has been suspended in order to enable the amalgamation of the two big airway systems to be carried out, the Tempelhofer airdrome has been thoroughly overhauled. It is now to be the sole Berlin airport for passengers, mail and freight traffic. The Staaken field, some miles outside the city, formerly used by the Aero Lloyd, is being retained for repair, testing and training purposes. This arrangement is an example of the economy and increased efficiency which are expected to result from the amalgamation. Passengers to and from London will no longer have to make the 35 min. journey between Berlin and Staaken; they will reach the Tempelhofer airport in less than half that time from the center of the city, and *vice versa*.

The landing surface at the Tempelhofer Feld has been improved, and the buildings have been rearranged and redecorated. All the machines have been smartly repainted in black and white and every trace of the two rival companies of last year has disappeared.

The time table for 1926 has now been published. The company proposes to run 39 lines, either itself or in cooperation with foreign companies on the pool system. The full time table includes 45 lines, but the opening of several of these depends on the outcome of the negotiations still being held in Paris with regard to the restrictions on German aviation. At present, political obstacles prevent the linking up of German airports with France, Italy, Czechoslovakia, and Poland.

Although the official opening day was April 6 ,a number of the lines will remain to be opened at various dates between now and June 1. The routes are as follows:—(1) Berlin-Hanover-Amsterdam-Ostend-London (April 19); (2) Berlin-Danzig-Königsberg-Tilsit-Memel (April 19); (3) Malmö-Copenhagen-Lübeck-Berlin-Dresden (April 19); (4) Berlin-Leipzig-Nuremberg-Munich (April 12); (5) Zurich-Munich-Vienna-Budapest (April 19); (6) Munich-Innsbruck (April 12); (7) Basle-Mannheim-Frankfort (Main)-Cologne-Dusseldorf-Amsterdam (April 19); (8) Zurich-Stuttgart-Mannheim-Frankfort (Main)-Hanover-Hamburg (April 6); (8A) Essen-Mulheim-Dortmund-Frankfort (Main) (April 6); (9) Malmö-Copenhagen-Hamburg-Bremen-Amsterdam (April 19); (10) Hamburg-Bremen-Dortmund-Essen-Dusseldorf-Cologne (April 6); (11) Rotterdam-Essen-Dortmund (April 19); (12) Stettin-Kalmar-Stockholm (April 26); (13) Dortmund-Essen-Cologne-Frankfort (Main)-Munich (April 6); (14) Berlin-Halle-Munich (April 12); (15) Berlin-Halle-Erfurt-Stuttgart-Zurich (April 6); (16) Berlin-Magdeburg-Cologne (April 6); (17) Berlin-Halle-Erfurt-Frankfort (Main)-Mannheim-Karlsruhe (April 8); (18) Berlin-Breslau (April 19); (19) Gleiwitz-Breslau-Halle-Cologne (April 19); (20) Breslau-Görlitz-Dresden-Leipzig-Halle (April 19); (21) London-Rotterdam-Dortmund-Cassel (April 8); (22) Dusseldorf-Crefeld-München-Gladbach-Essen-Dortmund-Brunswick-Berlin (April 12); (23) Flensberg-Kiel-Hamburg (April 6); (24) Danzig-Marienburg-Elbing-Allenstein (April 15); (25) Stettin-Schwerin-Hamburg (June 1); (26) Stettin-Stolp-Danzig (June 1); (27) Stettin-Berlin (April 15); (28) Stettin-Swinemunde-Sellin-Stralsund (July 1); (29) Frankfort-Giessen-Cassel (April 8); (30) Hamburg-Berlin (April 6); (31) Hamburg-Magdeburg-Halle-Leipzig-Dresden (April 12); (32) Bremen-Hanover-Brunswick-Leipzig-Chemnitz (April 6); (33) Dresden-Chemnitz-Plauen-Nuremberg (April 12); (34) Mannheim-Karlsruhe-Baden-Villingen-Constance (May 1); (35) Munich-Reichenhall (May 1); (36) Munich-Stuttgart-Baden-Baden-Mannheim-Darmstadt (April 12);



Junkers bombing planes, built in the Swedish plant of the Junkers company at Limhamn, near Malmo, Sweden, for delivery to the Chilean Government. The planes are three-engine machines and are said to be fitted with disappearing gun turrets.

(37) Plauen-Gera-Halle (May 1); (38) Basle-Stuttgart-Nuremberg (April 12); (39) Berlin-Danzig-Königsberg-Kovno-Smolensk-Moscow (April 19).

New Lines to Follow

The new lines contemplated, if the necessary conditions are achieved, are: (40) Frankfurt-Freiburg-Basel-Geneva-Lyons-Marseilles; (43) Copenhagen-Hamburg-Cologne-Paris-London; and (44) Berlin-Essen-Cologne-Paris. Route 32, Bremen-Hanover-Brunswick-Leipzig-Chemnitz, will, if possible, be extended to Prague and Vienna. Route 16 is to continue later from Cologne to Brussels and London. The German lines connecting with Basle will link up with the lines Basle-Chaux de Fondsle Locle (route 41 in the time-table), Basle-Zurich (42) and Geneva-Lausanne-Zurich (45). It is also hoped eventually that the lines ending at Zurich and Innsbruck will be extended southwards to Italy, and, if the political difficulties are overcome, that Warsaw will be connected with Berlin by way of Silesia.

The most important international line is still that from London to Moscow by way of Amsterdam, Berlin, Königsburg, and Kovno. Improvement on this route is already foreshadowed, when, by introducing night flying on the Berlin-Königsburg section, it will be possible to reach Moscow from Berlin in 15 hr. Leaving London at 8 a.m. summer-time, the passenger will reach Berlin at 5:15 p.m.; he will leave Berlin at 2 o'clock the next morning and reach Moscow at 5:30 in the afternoon.

The Flying Equipment

The Lufthansa has about 120 airplanes ready for service. Being purely an air transport enterprise and, therefore, not bound, as the old Junkers transport line, for instance, was bound, to any one make of machine, it is using, to start with, three types of Dornier machines, three types of Junkers, two types of Albatros, one type of Udet, and one type of Rohrbach. About 40 of the machines are in Berlin. The rest have been distributed throughout Germany in preparation for the opening of the cross-country network of airways.

New Finish Saves Time, Space and Expense

If aircraft production reaches the figures which the recommendations now being made to Congress and other factors indicate, the finishing rooms of the industry are apt to be greatly crowded during 1927.

To meet such a situation, Valentine & Company is offering a new and extremely fast drying finish, Nitro-Valspar. With this new product, which is a highly developed nitro-cellulose lacquer, all coats required in aircraft work can be applied in a half-day or less, as compared with a week or more when several coats of varnish are used. It dries almost as rapidly as it can be applied and produces a film which is at once tough, durable and proof against water and weather. The coating is hard and difficult to scratch or mar and its adhesive qualities are equal to the best varnish, but the film formed is much thinner and correspondingly lighter than varnish.

Practically any color is available in Nitro-Valspar and it is applicable to wood, metal and fabric surfaces. In no sense is it a substitute for wing dope, however. In fact, great care has been taken to prepare it in such a way as to avoid the shrinking qualities which are essential in wing dope, but which make for short life when applied on wood or metal surfaces exposed to the elements. It can be applied in place of varnish as a protective coating over wing dope and has the advantage not alone of greater durability but of not requiring removal around a patch when the latter is applied to repair a torn wing.

Lowers Production Costs

Rapidity in finishing, made possible with Nitro-Valspar, brings with it the attendant advantage of lower labor cost and smaller investment and interest charges on spaces devoted to finishing, for aircraft which normally would have to stand in the finishing room for several days are ready for shipment in a fraction of the time ordinarily required. And, of course, no artificial equipment is needed.

Best results in its application are obtained by use of spray equipment, but it can be brushed on if desired. One coat of Nitro-Valspar Primer, one or more of Nitro-Valspar gunglaze and about three coats of Nitro-Valspar Enamel are recommended, but, under certain conditions, some of these coats may be omitted.

Nitro-Valspar is furnished clear or as pigmented enamel. Remarkable for its unusual flexibility and adhesive properties, it is particularly suited to withstand severe exposure to the elements and rapid temperature changes to which aircraft are subjected.

Valspar Varnish, Valspar Enamel and Valspar Varnish-Stain, long standard products of Valentine & Company, are being used widely in the aircraft industry today, as heretofore. They are recommended especially for field work where spray equipment is not available, while Nitro-Valspar is used to best advantage in manufacturing and repair plants outfitted with spray equipment.

Nitro-Valspar is an outgrowth of a finish first developed by Valentine & Company for use in finishing seaplane hulls during the war. This nitro-cellulose product, afterward termed Valenite, was needed because, up to that time, a day was required to dry each coat of varnish employed and something had to be done to reduce this time. With Valenite, it proved possible to finish a seaplane hull in three hours, while before it had required six days. Although Valenite proved extremely durable, was absolutely waferproof and dried almost as fast as applied, it was much too hard to be rubbed down to an attractive finish.

Research work, continued since the war, has overcome this disadvantage and brought many other improvements. In the meantime, the automobile industry has been quick to recognize the advantages of nitro-cellulose finishes and, today, Nitro-Valspar is being used by many large automobile manufacturers. It is also ready for similar application in the aircraft field.

Heavy Foreign Trade Through Paris Airport

Foreign trade handled on the air lines from the port of Le Bourget, Paris, France, had a total value of more than 190,000,000 francs in 1925, or approximately $9,500,000, states a report to the Department of Commerce.

The following table shows the rapid increase in volume of merchandise exported and imported through the Le Bourget airport since 1921:

AIR TRAFFIC THROUGH LE BOURGET, PARIS

Year	*Exports*	*Imports*
1921	16,000,000 francs	7,945,000 francs
1922	29,646,000 francs	12,262,000 francs
1923	60,848,000 francs	16,843,000 francs
1924	89,090,000 francs	37,238,000 francs
1925	125,736,000 francs	64,555,000 francs

French Air Lines Granted Subsidies

Terms of subsidies granted to the Compagnie Internationale de Navigation Aerienne by the French Government for the year 1926 are contained in a convention entered into by the company and the Government and recently ratified by presidential decree.

The subsidies are given to the company's lines, Paris-Constantinople (via Strasbourg, Prague, Vienna, Budapest, and Bucharest) and Paris-Warsaw (at present via Cracow and eventually via Breslau).

Regular operation of planes handling passengers, merchandise, and mail, is required, consisting of a daily round trip from April 1 to Oct. 31, except Sundays and holidays, and three round trips per week during the remainder of the year. The subsidies are fixed at 9 francs 45 centimes per km. for the Spad and Potez planes of the company and at 5 francs 60 centimes per km. for the Salmson planes. The company is credited with having in service 45 Spad, 10 Potez, and 6 Salmson planes.

My Ideal Sportplane

By EARLE OVINGTON

It is only natural, for one who has flown for the past fifteen years, to have rather exact ideas regarding the ideal sportplane or 'flyabout'; and so I have mine. I prefer a two-place machine for reasons, to be outlined.

Firstly, with the pilot and passenger tandem, as they should be in a small plane, the fuselage is narrow. This means a snappy-looking job as compared with the wide fuselage necessary when two passengers are placed side-by-side. And it means much better visibility for the pilot. I was much disappointed, when I flew one of the modern three-place OX-5 jobs, at the poor visibility from the pilot's cockpit. It was not so good as in a Jenny.

Secondly, with two persons, the performance is better than with three, other things being equal. One might reply that in a three-place job one need carry only two people and get the same performance as in a two-place plane. Almost true, to be sure, but in most cases a plane is loaded to capacity when it takes off—that has been my experience. And when you're climbing out of a small field, or your engine quits when low down, the better performance is much desired.

Favor Two-Place Plane

Thirdly, the cruising range is much better with two aboard than with three. By having a large fuel tank in a two-place job, the pilot is able to choose great cruising range or high performance, as the contemplated "hop" may indicate, as it is never necessary to fill the tank just because you have a large one. Many a time, flying over the mountains here in California, I would have given a good deal for just another hour's fuel supply.

Fourthly, the two-place job is a blessing when you wish to turn down a third party: "So sorry, but my plane only takes one passenger". If you're carrying passengers for money, that's different, but, when flying for sport, one passenger is usually a party—two is often a crowd.

Looking at the matter from the manufacturers' standpoint, there are quite a few three-place jobs on the market in this country and a reliable two-place one would be an innovation. And I am firmly convinced that it would meet with a ready sale and enthusiastic reception.

Not a "Toy" Plane

I want a real sportplane—not a make-believe airplane with a little 'pop bottle' engine. I want a plane in which I can cruise the country with a fair assurance that I will get there and back. Nothing less than a four-cylinder engine for me, and my preference is a five-cylinder radial like the new Rickenbacker. These little toy planes make a hit with the lay crowd, and they are pretty playthings to hop off the field with on Sunday afternoons to 'show off', but not for me, when it comes to real cross-country cruising.

Now as to the characteristics which my ideal sportplane should have.

Rapid rate of climb, for a given horizontal distance traversed, is, in my opinion, to be desired above all else. This characteristic will not be of so much importance when good landing-fields are the rule rather than the exception, but any pilot who cruises nowadays must count on making fully seventy-five per cent of his landings in somebody's beanfield or pasture and often this field is newly plowed and surrounded by obstacles over which he must climb in getting out. I know that I have often wished for a helicopter. Incidentally, rapid rate of climb usually means low landing speed as well—highly desirable in this type of machine.

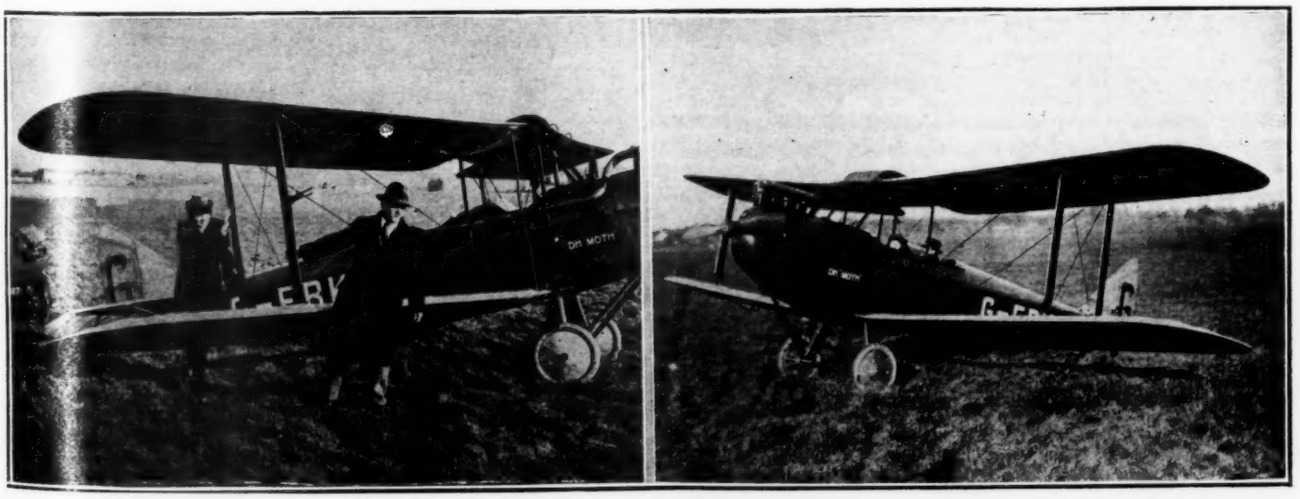
Even a rapid rate of climb, without relation to the horizontal distance traversed, is desirable, particularly in a mountainous country like California. Taking my case in Santa Barbara, I can fly only in one direction without crossing the mountains, and that is down the coast. And because our airport is practically at the base of the mountains, it is necessary for me to climb to 5000 ft. before I even commence my journey. To be sure, a fast plane that climbs comparatively slowly would get to its destination, perhaps, as soon as a slower machine that is a better climber, because the faster plane would make up for lost time when it did reach its altitude. But it's more fun to get your necessary altitude first and then go somewhere at a rather slow speed, than to climb more slowly and then go somewhere faster when you do straighten out on your course. And it's a pleasure airplane that I am discussing.

Cruising Radius

Great cruising radius, I should put next for my ideal sportplane. The airplane shows up best, in comparison with other vehicles, over long distances and much of the advantage of the plane is lost if it is necessary to land frequently to replenish the fuel. Then again, considering California, where one flies at high altitudes to cross the mountains, it is a waste of fuel and time to have to glide to earth for gasoline and then climb up again to continue the trip.

Consider the element of risk, which is always present to a certain extent where landings on emergency fields are to be made. The greater the cruising radius, the less landings, of course. Even from a pleasure standpoint, great cruising radius is desirable. When I start out for a distant point I like to keep going until I get there. I guess it is because I have hopped over the country so long in Jennies. No more long-distance stuff in the 'Old Reliable Crate' for me.

Speed is of least importance, in my opinion, for the sportplane. When I take my machine out of its hangar, I do so, primarily, because I want a hop. Often, to be sure, I also want to get somewhere. But the airplane is so much faster than the railroad train, or the automobile, that I am satisfied with moderate speed. I will acknowledge that there have



Along the right lines of the sportplane. Two views of the DH Moth characterizing its adaptability to the private flier.

been times,—racing against darkness in a Jenny with, perhaps, a head wind,—that I have prayed for more speed. But I doubt whether I would have reached my destination in a faster plane. I simply would have discounted the greater speed and started later. At any rate, I certainly would not sacrifice rapidity of climb, and cruising radius, in my ideal sportplane, for more speed.

Speed is only relative, anyhow. In the days when I got my first car (a single-cylinder Packard, by the way), tearing along the highway at 15 m.p.h. was an exciting procedure. In the present day of automobiles, the Jenny, to anyone except the pilot of the machine, is fast. When 200 m.p.h. airplanes are common, the speed maniacs will want planes that will go 300 m.p.h., so there you are!

A Matter of Speed

Eighty miles an hour in still air, with the engine throttled down and just purring along at quarter throttle, is about my ideal. That usually means 100 m.p.h. at full throttle. The Jenny, I will acknowledge, with its catalog speed of 70 m.p.h. and its true speed of about 60 m.p.h., is a bit slow. It is humiliating, bucking a head wind, and flying low over the highway, to have the car owners below you hold you on speed. Thirty miles an hour more speed will be just enough to make them take a back seat, besides giving you a little extra to buck a head wind.

As to the type of plane, that is, a biplane or monoplane, I am partial to the monoplane. That is probably because I learned to fly on one, a Bleriot, and did much of my early flying on a monoplane. Anyone who has ever flown a monoplane, loves it as compared to a biplane. And, looking at the matter purely from the esthetic standpoint, the monoplane has it all over the biplane. In my exhibition career, in 1911, I often received far more applause and prize money simply because I flew a beautiful French monoplane while my companions used the more prosaic biplane.

Personally, I like the appearance of the modern thick-wing monoplane. It is relatively cheap to construct, more easily repaired than the biplane, is aerodynamically more efficient than the biplane, affords much better vision, and readily adapts itself to all-metal construction.

All-metal construction is the coming thing, without a doubt. Even those who are making fabric-wing machines admit it. But, with them, I am not strong on the all-metal plane at present. In other words, I do not want the wing spars of metal. I do not consider that we know enough about the light alloys at present to put too much dependence on them at vital points. In my ideal sportplane, I would like the fuselage of metal, as crashing in a wooden fuselage is not conductive to a whole skin, and I would like the tail surfaces and struts of metal, but not the wings. And, until the all-metal construction is used, I would just as soon stick to the biplane. But I predict, here and now, that the all-metal monoplane will be the 'flivver' plane of the future.

The Pilot's Comfort

Comfort for the pilot is something to which the airplane designer and builder has, up to the present time, given too little thought. I want liberal size wind-shields and a cockpit in which I can sit for hours at a time in comfort. A five-foot airplane designer often overlooks the fact that there are other people in the world who have grown a little more than he has and who need more room than he does in an airplane cockpit. And, under this head of comfort, I shall include visibility. I want to see where I am going without having to put my head way out in the slip-stream.

Convenient storage place, for anything from a suitcase down to goggles and helmet, is also of importance. I use my plane like most people use cars,—to cruise around the country. And I want a place to put my suitcase, instead of being obliged to tie it on a wing as I do with a Jenny. This storage space should be easily reached from the ground and should be provided with a good, strong lock. A space for tools should also be provided entirely separated from the space in which a suitcase, helmet, or goggles are to be kept. Do not tell me to put my tools in a bag and keep them with my clothes. Tool bags get dirty.

Here is a wild idea, speaking of comfort. Many a time, cruising, I make my landings for the night about dusk. Inquiry develops the fact that a comfortable bed is a long way off, but that food may be obtained nearby. But what good is supper if one cannot get a night's rest? So, I have often walked to a town, from the place I landed, because of lack of transportation. I have often wondered why an air mattress could not be suspended inside the fuselage of the plane so that, by letting down the back of the rear seat, a comfortable bed would be available. The cushion from the passenger's cockpit would serve as a pillow. The pilot's head, of course, would be in the rear cockpit and his body protected by the fuselage. Four sockets round the edge of the cockpit could be provided to contain short steel tubes which would support a small canopy. Plenty of air, and complete protection from rain! Can you imagine 'airplane camping' in the future? I'd like to do it now. In fact, I often do, but I am much inconvenienced in a Jenny.

The present tendency in the development of commercial aviation, is toward the big plane and the three-place or mail feeder-line machine. The snappy, two-place sportplane seems to have been neglected, at least in this country. In Europe, on the contrary, the sportplane has received considerable attention.

A Definite Example

The DeHavilland Moth is the outstanding sportplane in England. In fact, it's about the neatest little sportplane in the world, in my opinion. It is a two-place job with a four-cylinder, air-cooled engine of 60 hp. And it has done a great deal to stimulate interest in aviation among a class of people who, up to its advent, took little interest in things aeronautical. Light airplane clubs have been formed all over England and, in almost every case, the DH Moth has been chosen as the official plane and an order placed for one or more.

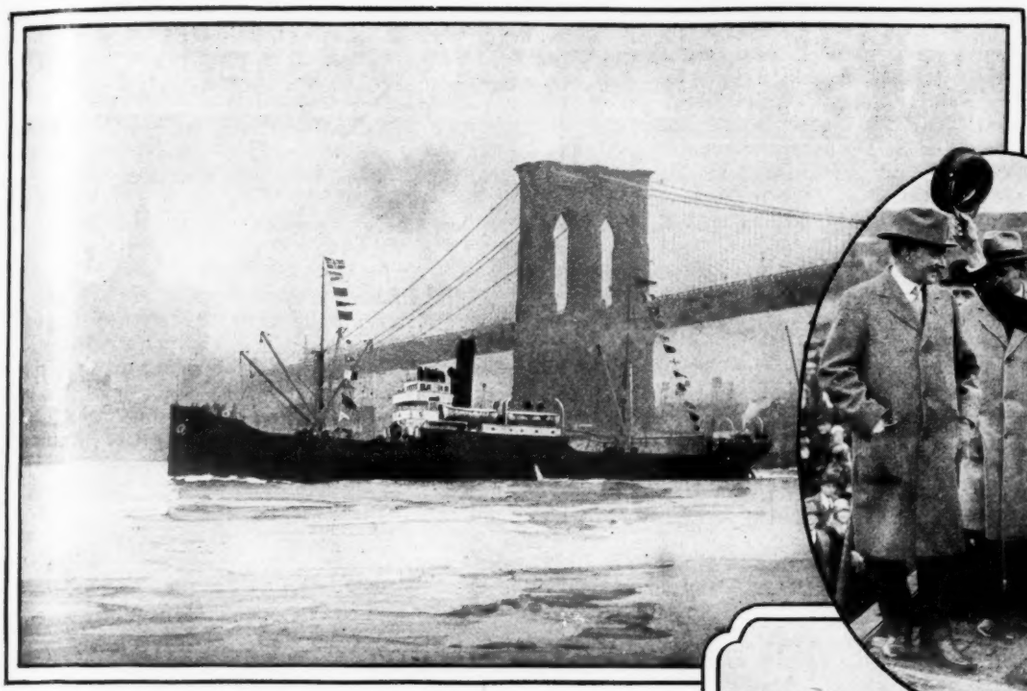
Personally, I am firmly of the opinion that the airplane will not really come into its own until the man in the street is brought into intimate contact with it. And I believe that the quickest way, and also the most satisfactory way, of establishing this contact is by the introduction of what is popularly described as the 'flivver' plane. Unquestionably, the demand for such a plane exists and this demand will become greater and greater as more and more people take their friends for 'hops'.

A New British Mooring Mast

The Cardington airship mooring mast

An airship mooring mast, claimed to be the highest in the world, has been erected at Cardington, near Bedford, for the use of the two British airships R-100 and R-101, now under construction for commercial purposes. The mast is 195 ft. high, and is constructed of steel trellis work on a 60 ft. base. Near the top are two circular platforms, one mounting the searchlights used in guiding the airship during mooring at night and the other serving as a balcony for passengers, who are carried up the mast by an electric lift. A similar mast at Ismailia is also nearing completion.

The airships, it will be recalled, are to be used in the operation of a passenger and mail air transportation service between London and India, later to be extended to Australia.



Left: Off for the North Pole! The S.S. Chantier steaming under the Brooklyn Bridge. Photos by Wide World.

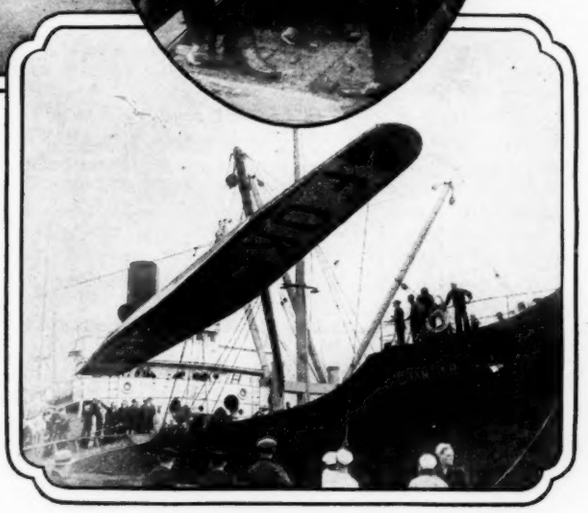
Below: Commander Richard E. Byrd and his brother, Governor Harry F. Byrd of Virginia.

Will the North Pole be Valsparred next?

Mid a blare of whistles, the good ship *Chantier* set sail recently for Spitzbergen, carrying Commander R. E. Byrd and his band of intrepid explorers on the first leg of their journey to the North Pole.

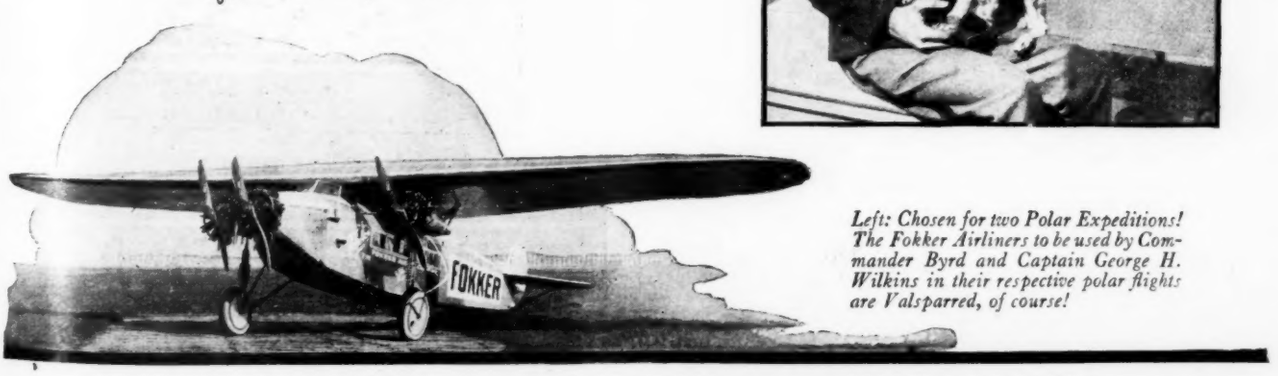
Placing his entire confidence in a heavier-than-air machine, Commander Byrd selected the Fokker Airliner powered by three Wright Whirlwind Engines, to carry him over the Polar Regions. Under the extreme conditions which this ship is likely to meet in the frozen North, the weatherproofing and finishing of the plane plays a most important part.

It is interesting to note in this connection that the wings, fuselage and tail surfaces of the Airliner are Valsparred—sufficient indication of what Commander Byrd and the Fokker Company think of Valspar!



Above: The huge Valsparred wing of the Fokker plane being hoisted aboard the Chantier.

Left: "Baby Eskimo," the Chantier's mascot with his keeper, R. H. J. McKay, U.S. Marine Corps.



Left: Chosen for two Polar Expeditions! The Fokker Airliners to be used by Commander Byrd and Captain George H. Wilkins in their respective polar flights are Valsparred, of course!

VALENTINE'S
VALSPAR
The Varnish That Won't Turn White

St. Jo Municipality Foster Flying

St. Joseph, Mo., certainly sprang a surprise on the aeronautical community when they came to the National Aeronautic Association convention at St. Louis in 1923, with a local chapter of some 2,000 members. Most of those who attended the convention had a vague idea that St. Jo had some sinister end in view simply because they could not understand this tremendous membership. As a matter of fact the reason is quite obvious to any one who knows the intense rivalry which exists between the Mississippi River towns. Certain men in St. Jo had decided that air traffic was to play an important part in the life of the nation. If St. Jo. was to get ahead of other river towns it must foster the development of this new form of transportation. The membership campaign for a large local chapter was part of the movement in educating the town to the need of pushing air development and making St. Jo a center for mid-West air traffic.

The Argument for Progress

The city fathers presented the following argument to their fellow citizens:

> St. Joseph is one of the oldest "river towns." The day was when it was without a trade rival. It was then that the nucleus was laid for the great jobbing and wholesale business that even now challenges, if not actually surpasses that of Kansas City, even as it far exceeds that of Omaha.
>
> The temporary decline of waterway traffic and the fact that St. Joseph, while liberally supplied with through rail service north and south lacked through East and West lines, was reflected inevitably in comparative growth. St. Joseph business men know that they are fighting for their economic life against the ever increasing pressure of competition, South and North.
>
> Speed is the demand of modern business. The pioneer jobbers and wholesalers of St. Joseph—back in the period of the pony express—thought of their trade territory in distance by stage. For generations they have been thinking of it in distance by rail. The time is now come for them to think of it only in hours by air. An individual business, or a manufacturing or jobbing city, prospers only to the degree it is connected with its sales field. It is obvious that if St. Joseph can extend its sales arm, via air, to a distance actually thrice that measured by rail, great good must result.

As a result of continued propaganda along these lines the citizens of St. Joseph have gradually come to a realization of the value of air transport to their city and are ready to push its development.

In Rosecrans Field the city has one of the best airports in the mid-West. The field is owned by the city and is the only field so owned on the route of the N.A.T. from Chicago to Dallas. The N.A.T. will use St. Jo as an overhaul and maintenance base for all power plant work and officials of the company declare it to be one of the most suitable fields on their whole route.

In future years, when air transport has developed in a large way, other towns may wish that they had followed St. Jo's lead and awakened its citizens to the value of the new method of locomotion.

South American Altitude Record Broken

A recent telegraphic despatch from Cochabamba, Bolivia to La Pas, states that, during a trial flight, the altitude record for airplanes in South America was broken, and an altitude of 6,650 meters (about 21,817.5 ft.) was reached in 73 min.

The previous record is said to have been made in December of 1924, in Palomar, near Buenos Aires, when an altitude of 6,100 meters was reached.

Lieut. Doolittle, with Lap Pack type; Lieut. Brookley, with Seat Pack type — IRVIN Air Chutes.

In the Service of U. S. A.

They think nothing about it now. These men of the Army Air Service. They step easily into their "IRVIN" harness before going up. And then as they sit comfortably with the "pack" attached, they forget it entirely. Yet it's ready for instant use—if they need, or want it. And it gives them that confident feeling of "ready for anything". Likewise with the U. S. Navy and U. S. Air Mail services.

Manufactured by

Irving Air Chute Co., Inc.
523 Main Street
Buffalo, N. Y.

Cable Address: "Irving, Buffalo"

AIR CHUTES IRVIN TRADE MARK

3

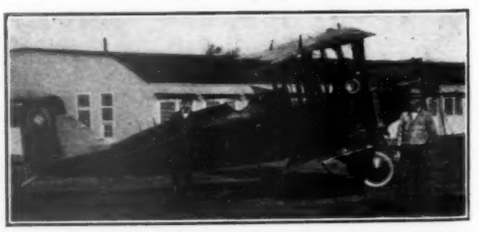
The Same Reliable LS5

$2875 - F.O.B. Factory - $2875

ITS EQUAL IS YET TO BE BUILT

We enter all lines of business to make money. The LS5 is the best money maker on the American market. It has filled the need of a ship with minimum power and operating expense plus maximum useful load.

WILL GUARANTEE DELIVERY WITHIN 24 HOURS AFTER RECEIVING ORDER



LINCOLN STANDARDS ARE REPRESENTED FROM ALASKA TO THE TROPICS.

Write now for particulars.

Lincoln Standard Aircraft Co.,
Lincoln, Nebr.

MONUMENTAL AIRCRAFT, INC.

AIRCRAFT SUPPLIES

Special Spring Overhaul Offers

No. 1 $3.60 1 set 80 OX5 gaskets 1 set 21 hose connections	No. 7 $11.52 1 set water outlets 8 large valve action pins	No. 13 $3.28 1 gal. dope 1 box 20 assorted pinked edge patches 2 needles & 1 spool lacing thread
No. 2 $10.96 Offer No. 1, plus 8 intake valves & springs 8 exhaust valves & springs 8 intake push rod springs	No. 8 $25.28 No. 7, plus 8 intake yokes. 8 exhaust yokes. 16 small valve action pins 8 medium valve action pins	No. 14 $8.00 choice of 1 Canuck elevator, or 1 Canuck rudder, or 1 Canuck aileron, all covered
No. 3 $36.08 No. 2, plus 8 pistons & rings 8 piston pins	No. 9 $28.80 1 new D81x2 Berling magneto 1 new Zenith carburetor 1 new water pump	No. 15 $20.00 1 Starr copper tipped Club propeller 2 new Goodyear cord 26 x 4 tires
No. 4 $109.68 No. 3, plus 8 new cylinders 8 connecting rods 1 set connecting bearings	No. 10 $21.00 1 set main bearings. 1 thrust bearing. 1 crankshaft assembly	No. 16 $3.20 1 set OX5 spark plugs 1 set spark plug terminals 1 set ignition wires
No. 5 $81.78 Same as No. 4, substituting 8 used guaranteed cylinders & studs in place of new cylinders.	No. 11 $33.60 1 right Canuck side cowl 1 left Canuck side cowl 1 new Harrison Hex. core radiator	No. 17 $3.48 1 prop. hub puller. 1 prop. hub nut wrench. 1 crankshaft nut wrench 1 lb. No. 19 copper safety wire 1 gross 1/16″ cotter pins
No. 6 $71.68 No. 1 & No. 3, plus 8 used A1 guaranteed cylinder assemblies	No. 12 $17.88 1 set 4 JN or Canuck landing gear struts, cut to fit 38″ shock absorber cord. 1 axle.	No. 18 $20.00 1 oak or walnut, copper tipped toothpick propeller 2 slightly used 26 x 4 tires

No articles in the special offers may be substituted by any articles not listed above. Items may be interchanged at a proportionate, corresponding alteration in price. The offers may be added to but not reduced.

No orders accepted unless accompanied by 25% of the purchase price. State preferred means of shipment.

The recent addition of the entire stocks of several prominent aircraft dealers in U. S. and Canada has made these offers possible. The regular list prices on these items will positively prevail after May 15th, 1926.

TAKE ADVANTAGE OF THE REDUCED PRICES NOW.

To All Plane Owners and Operators

For our mutual benefit we want you to know as much as possible about Monumental Aircraft, Inc., owners of the largest stock of JN and OX material in the world, and lessees of the greatest amount of warehouse space used in this industry—20,000 square feet. Our old customers will be interested to hear of our incorporation last January for $100,000 under the laws of Maryland; both old customers and prospective ones will be more than interested to know of our purchase of the entire lot of JN and OX material of the Ericson Aircraft, Ltd., of Toronto, at a figure which enables us to give extraordinarily low prices to our clients. We have in addition absorbed all the stock of American Aircraft, Inc. of Baltimore.

At great trouble and heavy expense in freight and handling charges we have finally classified all parts. We have scores of steel bins and trays systematically arranged and filled with all parts for JN's and OX's, from which we can fill orders at a moment's notice.

The above spring overhaul offer is only good for a limited time, but you should have our catalogue for general use. The prices will amaze you. Send for it.

MONUMENTAL AIRCRAFT, INC.

1030 N. CALVERT ST. BALTIMORE, MD.

AIRPORTS AND AIRWAYS

Vancouver, Wash.

By J. G. Langdon

The Rankin Flying Service has moved to Vancouver from Walla Walla, where they have conducted a flying school for several years. They have one training plane on the field now and will have a second one out by April 10. A special air taxi plane will be on the job within thirty days and a twenty-four hour air taxi service will be maintained during the summer as an experiment in night cross country flying. The machine will be equipped with parachute flares for emergency use and, of course, the price of night flying will be more than daylight flying. Sightseeing flights will be made daily over Vancouver. Special trips will be made up the Columbia River Gorge, over the Cascade Mountains and around Mount Hood in Oregon and Mount Adams in Washington. This is conceded America's finest scenic district. On this trip Mounts Rainier, Saint Helens, Washington, Jefferson and the Three Sisters will be plainly visible from the airplane. Several students have already enrolled in the Rankin School and the spring class will start on April 15. All instruction is under the personal supervision of J. G. "Tex" Rankin, a commercial pilot with 2100 flying hours throughout Oregon, Washington, Idaho, Montana, Nevada, California, Arizona and New Mexico. He was the first pilot to land an airplane in Death Valley, 280 ft. below sea level. He has carried 9800 passengers since Jan. 1, 1920, without an injury to anyone. He has taught many of the successful commercial pilots now flying in the West. The Rankin Flying Service will start construction of a hangar, office and shop about April 10. A gasoline pump will also be installed to furnish fuel to commercial fliers.

Tex Rankin of the Rankin Flying Service has just returned from a five weeks tour of the commercial aircraft industry in the East. He visited Denver, Wichita, Dayton, Troy, Kansas City, St. Louis, Bryan, Detroit, Chicago, Omaha and Lincoln. He was high in his praise of the Waco, Travel Air, Swallow, Eaglerock and Laird, all OX-5 airplanes of exceptionally good performance.

The Brubaker Aerial Survey Co. of Portland is now completing a map of the Bull Run water shed (Portlands water supply) for the City of Portland. The Brubaker Co. uses an Eastman K-5 camera and is turning out exceptionally good work.

Jimmie Rinehardt, Portland's sixteen year old aviator, has set his Jennie up on the Vancouver field and has been carrying several of his school mates on trips over the Columbia River district.

LeRoy "Doc" Brown, Portland dentist, has been flying his Oriole all the winter and recently made his first cross country trip to his old home at Pomeroy, Wash., a distance of 300 miles from Vancouver. He was accompanied by his wife.

AIRPLANES FOR SALE

We sold over $110,000.00 worth of airplanes, motors and parts last year and still have a large number for sale. We believe the prices on airplanes are at their lowest, and a small deposit on any of our airplanes will hold same for spring delivery. We expect a sharp advance in prices very soon.

We still have plenty of Standards, Jennies, Canucks, Orioles, D.H.'s with Liberty motors, Spads less motors, T.M. Scouts with and without motors. A large number of these airplanes are set up, test flown, and ready for immediate fly away delivery. Come and take your pick.

NEW STANDARD J-1 AIRPLANES with guaranteed overhauled Hispano-Suiza motors, 150 H.P.	$1500.00
NEW STANDARD J-1 AIRPLANES with new OXX6 motors	1300.00
NEW STANDARD J-1 AIRPLANES with Government overhauled OXX6 motors	1100.00
NEW STANDARD J-1 AIRPLANES with new OX5 motors	1100.00
NEW STANDARD J-1 AIRPLANES with Government overhauled OX5 motors	900.00
NEW STANDARD J-1 AIRPLANES without motor	650.00

These airplanes come complete with tools and instruments and the front seat is built so as to accommodate two passengers. These airplanes have been reconstructed and new longerons, new controls, new wires, new struts, new fittings, new instruments were installed where needed. One-third deposit will hold any of the above airplanes for spring delivery, storage and insurance free.

No bond required
No charge for breakage

LEARN TO FLY
$100.00
INCLUDING SOLO

Room and board near field at $10.00 per week.

Eight years without an accident

76 Students Graduated in 1925

We guarantee to solo our students regardless of the number of flying hours required. We also furnish planes at very reasonable rates for those who wish to qualify for the F.A.I. pilots certificate and we maintain an employment agency for our graduate pilots.

The flying school of the Robertson Aircraft Corporation is one of the oldest and best known in the United States. Our instructors are ex-army aviators and are mail pilots with wide experience and our training equipment is the best obtainable. In over eight years of operation our students have never damaged a ship in their solo flights.

The flying field is approximately six miles from St. Louis and is easily accessible by railroad, street car and hard surfaced roads. It is the largest and best privately owned field in the country and the International Races of 1923 were held there. Mail planes arrive and leave daily.

Our course requires about two weeks, depending on the individual, and after its completion the refinements of the art can be gained only from experience. Commercial aviation is a rapidly growing industry. Don't delay! Enroll now!

WRITE FOR BOOKLET

It is not necessary to purchase an airplane in order to take this course.

ROBERTSON AIRCRAFT CORPORATION

OPERATORS OF UNITED STATES AIR MAIL ST. LOUIS-CHICAGO

LAMBERT-ST. LOUIS FLYING FIELD, ANGLUM, MO.

Vern "Anti-lift" Bookwalters, who weighs 100 lb. more than a horse, has just set up his good ship "Clunk" and is carrying passengers on Sundays. Claude Ryan recently gave his little monoplane the supreme test by getting Bookwalters to fly it. We were all surprised to learn that even the seat held up during the test.

Lawrence "Happy" Roundtree, Portland flier, has set his Jennie up and left for his summer headquarters, Aberdeen, Wash.

Earle N. Shahan is getting ready to set up his four-place, 220 hp. Hisso Standard, which he intends to use on the beach at Seaside this Summer.

Pilot Jack Clemence, one of the old timers around Portland, has been flying Doc Brown's Oriole on picture work for the Brubaker Co. this Spring.

J. G. "Hiriam" Langdon has been added to the flying staff of the Rankin Flying Service and will do passenger work at Vancouver and Seaside, Ore.

F. W. Anderline, who has been in the employ of the Rankin Flying Service for several years, will probably be in charge of cross country flying on the Rankin staff this summer.

Since Tex Rankin became the father of a pair of twins, his chest is getting out almost as far as his waist line.

Salesmen Fly to New York

Carrying six salesmen of the Curlee Clothing Company of St. Louis, a Sikorsky, sixteen-passenger airplane, arrived on April 10 at the air mail station at Hadley Field, near New Brunswick, N. J., from St. Louis, after making stops at four stations en route. The plane, piloted by Roscoe Turner, left St. Louis late Friday afternoon and flew to Dayton, Ohio, where one salesman landed. Other stops were made at Bellefonte, Pa., Harrisburg, Pa., and Middletown, Pa.

The flight continued to Roosevelt Field, Mineola, where the New York representative of the company alighted, after which M. N. Franklin, sales manager of the company, who is in charge of the tour, inspected the company's branches in the New England cities as far as Portland, Me.

Santa Barbara, Cal.

By Earle Ovington

Dr. J. Bert Saxby, Jr., called "Bert" within a hundred yards of a Jenny, is trying to put one over on the Huff Daland Dusters by applying their cotton dusting methods to the dusting of walnut trees. Walnut trees, like cotton plants, have their own pet variety of parasites and Bert figures that he can "knock 'em out" more pleasantly, quickly and profitably by sitting in the pilot's cockpit of his faithful Jenny, than by pumping poison dust at them from the ground. He has made all arrangements to prove that he knows what he is talking about, having replaced the passenger's seat in his Jenny with a box in which to keep the dust. Then he mimeographed a bunch of invitations and distributed them around the walnut district as every true "pilo" should distribute printed matter—by scattering them from his plane.

I hasten to add, in passing, that I hope Bert's old coffee grinder, otherwise known as an OX-5, keeps on the job while he is over the trees. I have never set her down in a cotton field but I should imagine it is softer than a walnut orchard!

Dwight Faulding sold his Jenny to a fellow in a neighboring town. No, he had nothing against the town or the inhabitant thereof. Just got tired of flying the old crate. Dwight does not know it yet, but he is all lined up for a Swallow.

Which reminds me, I have taken the distributing agency for the Swallow in southern California. Walter Varney, up in Frisco, had the whole of the Pacific coast but Walter is busy with his new air mail line, and his many prospects in northern California, so he generously relinquished southern California to me. I have ordered three planes by wire, to prove my faith in commercial aviation, and my private opinion is I shall sell them all before they get here.

The officers of the Santa Barbara Aero Club are going down to Los Angeles (in Jennies, because the Swallows will not be here in time) to attend the first meeting called by the Cali-

Aeromarine

INERTIA STARTER

PATENTED IN U. S. A. NOVEMBER 17, 1925

Foreign Patents Pending

MODEL "A"

HAND OPERATED

FOR ENGINES UP TO 2500 CU. IN. DISPLACEMENT, AND 150 LBS., PER SQ. IN. COMPRESSION.

The 1925 NATIONAL ADVISORY COMMITTEE for AERONAUTICS in its Eleventh Annual Report to U. S. Congress, states that "the AEROMARINE INERTIA STARTER has solved the starting problem and is in wide use in the Navy."

HEALEY-AEROMARINE BUS COMPANY, Inc. **KEYPORT, N. J., U.S.A.**

When Writing to Advertisers, Please Mention AVIATION

fornia Development Association to seriously consider commercial aviation. That is a good sign, when such a world-renowned organization turns its attention to the airplane as a commercial vehicle.

Hoyt, with a Travel Air, dropped down last week and gave some of the local pilots a hop in a real machine. The Travel Air is just getting into southern California and it is already making good. It is a fine little airplane. I know first hand, because Hoyt was good enough to let me take it up to 4,000 ft., alone, and stunt it. It does most of the stunts easily, except that it hates to spin. Which is in its favor, considered from the commercial standpoint.

Swallow Airplane Mfg. Co. News

Earle Ovington of Santa Barbara, Calif., who is still an enthusiastic flier after 15 years experience, has signed a dealer contract with the Swallow Airplane Mfg. Co., of Wichita, Kan., for Southern California. The company delivered three standard Swallows to Mr. Ovington during the week of April 19.

Another new Swallow dealer is F. L. Barchard of Chicago. He has contracted for the territory included in the northern half of Illinois and the southern half of Wisconsin. Delivery of the first plane was made to Mr. Barchard on April 16.

Walter T. Varney's mail planes, which were found to be underpowered for the Elko, Nev.,-Pasco, Wash., route, are being re-equipped with Wright Whirlwind 200 hp. engines. The work of installation is being rushed at the Swallow factory.

Spokane, Wash.

By E. Harve Partridge

With a crowd of thousands watching and cheering, Pilot Leon Cuddeback hopped off from Pasco at 6:22 a.m. on April 6, with the first load of contract air mail to be carried from Pasco, Wash., to Elko, Nev., where it was to be loaded aboard the Government's transcontinental planes. Walter T. Varney's Swallow with C6 engine went into the air with 407 lb. of mail and it arrived at its destination at 12:38 p.m.

Three national guard airplanes from Spokane, piloted by Maj. John Fancher and Capts. Tom Symons and Harold Neely, flew to Pasco and escorted the mail plane for a short distance on its maiden flight.

The starting of the contract air mail route was made a ceremony for the entire West. An old-time Stagecoach left Spokane carrying mail in the methods of a half century ago. It was Spokane's "stunt" to boost the air mail and the coach was given a warm reception over its 200 mile journey. It required a week for the trip.

Newspaper photographers by the score took pictures of the ceremonies and post office officials from Spokane, Seattle and other cities attended.

Chicago News

By Otto Klein

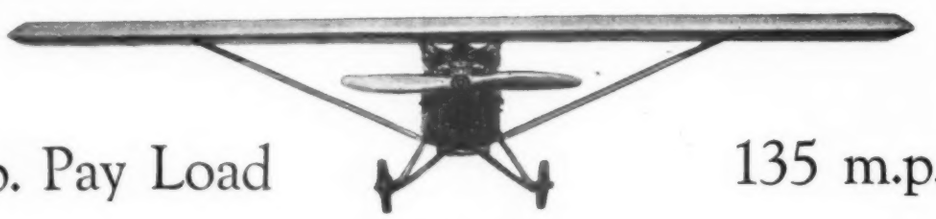
The Yackey Aircraft Co. reports that so far six of the Robertson Aircraft Company's DH's have come in on the new Air Mail route. The Yackey Company reports considerable activity at their field. Spring sales of ships have increased with leaps and bounds and only the other day the company sold one of their large Yackey Transports to the Aerial Photographic Service, Inc., of this city. The Yackey Company has at present a number of ships in work and has excellent prospects for the coming months.

La Pierre Cavender has taken the local agency for the Waco through the Midwest Airways Corp. of Monmouth. The first ship was delivered last week at Ashburn Field where it will be permanently stored. Cavender has sold his Canuck to Francis Schaffner, a student of the Heath Airplane Co.

Walter Meyer flew to St. Louis over the week end in his Liberty Six Standard. Meyer is still flying from Morton Grove although the real estate men have carefully placed large street signs all over the subdivided field, probably to enable the flier to find the right street to land in. Between the sign posts and the sidewalks and sewers, Walter Meyer is having a lovely time hopping his Standard out of the field.

Perry - Austen
COMMERCIAL
Acetate Nitrate **DOPES** Clear Pigmented
Contractors to United States Government
NEW FINISH—GLOSS PIGMENTED DOPE
SAVES COAT OF VARNISH
Write for Information.
Perry - Austen Mfg. Co. - Staten Island - N. Y.

The Alexander Eaglerock
An OX-5 job that is a revelation, combining speed, lift, climb and stability with beauty of design and rigidness of construction at the lowest price for a ship of its class in the field.
PRICE—$2475 ON THE FIELD, DENVER
ALEXANDER AIRCRAFT CO.
Associated with Alexander Industries
ROOM 401, ALEXANDER INDUSTRIES BLDG.
DENVER, COLO.


600 lb. Pay Load
135 m.p.h.
WRIGHT 200 H.P. MOTOR
MANUFACTURED BY
RYAN AIRLINES, INC.
RYAN M-1
3200 BARNETT AVE.
SAN DIEGO, CAL.
"The Plane That Pays A Profit"

WOODSON EXPRESS
Type 2-A Four Place

FOR PERFORMANCE, RELIABILITY, MANEUVERABILITY, SAFETY AND ECONOMY, THE WOODSON EXPRESS IS UNEQUALED.

This model will carry a pay load of 600 pounds exclusive of pilot and fuel for 4 hours and has a seating capacity for three passengers and pilot making it a most desirable all-around plane.

FOR EXPRESS, MAIL AND PASSENGER LINES, TAXI SERVICE, MAPPING, SKY-WRITING, ETC.

Powered with either the 260 HP Salmson water cooled radial or the 200 HP Wright J-4 Whirlwind air cooled radial.

Deliveries are being made in numerical order and orders for early spring delivery must be placed now.

It Will Pay You Well To See This Plane Before You Invest In Other Equipment.

We will gladly give a demonstration without obligation, at any time you can arrange to visit our field at Bryan.

Write or wire now for appointment

WOODSON ENGINEERING COMPANY
BRYAN, OHIO

The Aeroplane

Published Weekly

175, Piccadilly, London, W.1
England

CHARLES GREY
Editor

Subscription Rates
for U.S.A.

1 year—$8.50

United States Air Forces

Air Service at Sesqui-Centennial

The United States Army will participate in the Sesqui-centennial International Exposition at Philadelphia, Pa., by sending a detachment of troops with equipment representative of various arms and branches of the service. The Secretary of War has named Maj. Gen. Douglas MacArthur, Commanding General of the Third Corps Area, to be the War Department's representative at the Exhibition. He has been directed to carry out the entire plan of the Department's participation. The troops named to compose the Exposition Detachment are:

The Air Service is to be represented by one composite squadron of 13 officers and 53 enlisted men which will be made up as follows: 3 officers and 12 enlisted men and 3 pursuit planes from Selfridge Field, Mich.; 3 officers, 24 enlisted men and 3 bombardment planes from Langley Field, Va.; 2 officers and 5 enlisted men and 2 observation planes from Bolling Field, Washington, D.C.; 1 officer, 2 enlisted men and 1 observation plane from Mitchel Field, L. I., N. Y.; 1 officer and 1 smoke screen plane from McCook Field, Ohio; 2 officers, 10 enlisted men and 1 balloon from Aberdeen Proving Ground, Md.

Coordination In Buying Aircraft

An Aircraft Procurement Board to coordinate aerial purchases in the different departments of the government would be provided by the bill which Representative Vonson (Dem.), of Louisa, Ky., introduced April 14.

The board would be composed of the Chief of the Air Service of the Army, the Chief of the Bureau of Aeronautics of the Navy, and Assistant Secretaries of War, Navy, and Commerce. In addition to supervising the needs of the different groups, it would be the duty of the board to outline a policy of procurement for the Federal Government.

Sets Limit of 2,200 Planes

At a conference in executive session with Secretary of War Davis, the House Military Affairs Committee on April 14, decided upon the clarification of the present miltary aviation bill so as to limit definitely the number to 2,200 of airplanes on hand at the end of the five-year program.

The bill provides for increasing the air force to 2,200 planes. There was doubt in the minds of committee members as to whether this was inclusive or exclusive of 400 planes now being built under contract.

The Secretary of War was called in and informed the committee that the department really wants only 2,200 planes.

Enlisted Men to Fly

Eleven enlisted men of Chanute Field, Rantoul, Ill., who were appointed flying cadets, left on March 10 to take primary flying training at Brooks Field, Texas, viz: Staff Sgt. Leo F. Wood, Corporals Clarence W. Hudson and Loris R. McPike, Private, 1st Cl. Jack Asbury, Pvts. Dale L. Bennett, I. Smith Homans, Everette F. Masburn, George M. Sexson, Dwight V. Sinninger, Orville Young and Stanley C. Robbins.

Army Air Orders

Sec. Lieut. Howard G. Davidson, A.S., Kelly Field, to Scott Field.

Sec. Lieut. John L. Hitchings, A.S., relieved from duty A. S. Adv. Fly. Sch., Kelly Field, and will report to Com. Off.

Sec. Lieut. Ernest Starkey Moon, promoted to rank of First Lieut. Lieutenant Moon will remain in present duties.

Following officers of the A.S. are designated as students

at the Command and General Staff School for 1926-1927 course, and will report in person to the commandant, Command & General Staff School, Fort Leavenworth: Majs. Oscar Westover, Langley Field, Horace M. Hickam, Langley Field, Thomas Dew Milling, McCook Field, Leo G. Heffernan, Langley Field, Hugh J. Knerr, Langley Field, Byron Q. Jones, Washington, Fred H. Coleman, Langley Field, Edwin B. Lyon, Langley Field, Michael F. Davis, Langley Field and Capt. George C. Kenney, Langley Field.

Officers and men of Fighting Squadron 2 A.S.B.F. at San Diego. At the left is the Boeing Fighter-FB 1, and at the right the Curtiss Hawk (F6C-1). This squadron will soon be completely equipped with these types and has just completed two months intensive work with the fleet from the U.S.S. Langley, using Voughts.

Navy Air Orders

Capt. James J. Raby det. comdt. Nav Air Sta., Pensacola, to continue instruction in aviation at that station.

Comdr. Robert W. Cabaniss det. Nav. Aircraft Fact., Navy Yd., Phila., to Comdr. Airef. Sqdns., Battle Flt., and fly. com. of U.S.S. Aroostook.

Comdr. Emory D. Stanley (SC) det. off. of Nav. Intelligence, Navy Dept., to Airef. Sqdns., Sct. Flt.

Lieut. Guy Fish (MC) det. Army Sch. Av. Med., Mitchel Field to Nav. Air Sta., San Diego.

Lieut. Francis E. Tierney (MC) det. Army Sch. of Av. Med., Mitchel Field, to Nav. Air Sta., San Diego.

Lieut. George W. Wilson (MC) det. Army Sch. of Av. Med., Mitchel Field, to Nav. Hosp., Puget Sound.

Lieut. Cecil P. Harper det. Nav. Air Sta., Pearl Harbor, T.H., to Nav. Air Sta., Pensacola.

DOPES

PIGMENTED DOPES
VARNISHES ENAMELS

TITANINE

MADE BY
TITANINE, Inc.
UNION, UNION COUNTY, N. J.
Contractors to U. S. Government

"HEART 'O THE HILLS"
RARE OPPORTUNITY

We offer 300 and odd acres of isolated property in the heart of a Connecticut State Forest Reserve (Litchfield County). Level cultivated fields, meadows, wood and pasture lands. Suitable for club or private estate. Sites available for buildings, hangars, landing fields, 18 hole golf links and tennis courts. Extensive views. Elevation 1400 ft. A short hour's flight from Long Island. One mile from Housatonic River Valley, seven miles from upper Harlem Valley and Auto Trunk Line Highway. One mile from Housatonic Auto Trunk Line Highway.

For further particulars and terms address
RIPLEY BLOUNT & COMPANY
WEST CORNWALL, CONN.
If you're looking for country property, write us.

BRAND NEW JENNIES, original crates, perfect condition.$1500.00
New Jennies, uncrated for storage, excellent condition .. 1250.00
Very slightly used Jennies, splendid condition throughout. 1000.00
Used Jennies, ship and motor in good condition $650.00 to 800.00

Canucks, Standards, (three and five place), and Thomas Morse Scouts. Parts, accessories, motors, wings, dope and supplies.

Exclusive agents for STUART HIGH LIFT WINGS, *for* Standards, JN4s, or Canucks. *Write for information.*

Southern Airways Inc.

Visit us at either
Love Field, Dallas, Texas or San Antonio, Texas

Write our home office
210 College St., San Antonio

The Weekly Issue of AVIATION That You Miss

because you are not a regular subscriber, may contain the article, news story, picture or advertisement which you could have used with profit.

If you are a service or a civilian flier, AVIATION is an indispensable adjunct to your calling, because in each weekly issue it publishes more service and commercial flying news than appears in any monthly; and, more important, it is NEWS when it appears in AVIATION.

AVIATION

The Oldest American Aircraft Magazine — The Only American Aircraft Weekly

When Writing to Advertisers, Please Mention AVIATION

Where to Fly

CALIFORNIA

THE RYAN SCHOOL OF AVIATION

O. B. STAR ROUTE SAN DIEGO

Ideal flying weather all Seasons. Very best of planes and instructors. Opportunity to study latest planes and construction.

A few recommended students will be given employment in our shops, while learning to fly.

CONNECTICUT

NEW ENGLAND AIRCRAFT CO., INC. New England's largest, most complete airdrome, of 96 acres. Commercial flying service. Complete flying instruction. Inter-city passenger and light express service by appointment. Advertising, photography. Our rates are reasonable and we make commercial pilots. Waco 9 distributors for New England.

805 MAIN ST., HARTFORD, CONN.

FLORIDA

Modern planes for any purpose, at any time. Rates reasonable. Flying schools located at Atlanta, Ga., Daytona Beach and Tampa, Fla., where you can fly in comfort in any season. South Eastern Distributors for Swallow Airplanes.

Address all correspondence to **A. B. McMULLEN COMPANY**

15 PEACHTREE ARCADE, ATLANTA, GA.

ILLINOIS *Only 50 miles west of Chicago*

EAGLE AIRPORT SCHOOL OF AVIATION.

Herman J. Neubauer, M.D.

Hinckley, Ill.

Learn to Fly at our up-to-date school at very reasonable prices. Complete ground and air course. Come any time. Ideal accommodations for students. Expert instructors. Write for information.

ILLINOIS

PARTRIDGE, Inc.

Aeronautical Instruction

Aero Club of Illinois Mail Address:

Field: Chicago, Ill. *Write for Booklet* 430 S. Michigan Ave.

ILLINOIS. **YACKEY'S CHECKERBOARD FLYING FIELD.** *Operated by the Yackey Aircraft Co., one of the oldest flying schools in the U. S.* The Yackey Aircraft Co. is conducted by men who have made a success in all branches of flying before the war — — in the war and after the war — — U. S. Army, U. S. Air Mail and Civilian. You can only learn from one who knows. You only know from experience. We have proven our ability. YACKEY AIRCRAFT COMPANY, Forest Park, Illinois.

ILLINOIS **CAMPBELL AIRPLANE CO.**

Best equipped commercial field in the middle west. 24 hour service with night flying equipment and used by N. A. T. mail line Chicago to Dallas. A limited number of students accepted for training at reasonable rates. We invite cross country pilots to make use of our facilities.

Mail address 515-18 ST., MOLINE, ILLINOIS.

INDIANA

HOBART AVIATION CO. Flying Course, including complete ground course, $185.00. Ideal flying country, competent instructors, thirty miles from Chicago, Ill. on the trans-continental air mail route. A few students will be given employment in our shop. Write for details. No bond for solo flight. *Flying Field,* HOBART, IND. *Mail Address,* 1106 BROADWAY, GARY, IND.

MARYLAND LOGAN FIELD.

CHESAPEAKE AIRCRAFT COMPANY, Headquarters Armory, Baltimore. Passenger and express service. Aerial photography and advertising. Flying school $250. for course. No bond for solo. *Agents for TRAVEL AIR Planes, Maryland, Virginia & District of Columbia.* Phone Vernon 3760.

MICHIGAN

DETROIT'S OWN AVIATION SCHOOL.

Complete Courses in: Aero Motor Repair, Airport Supervisory, Airplane Construction, Flying.

DETROIT SCHOOL OF AVIATION—3967 GRAND RIVER AVE. DETROIT, U.S.A. *Air Center of the World.*

MICHIGAN

NILES SCHOOL OF AVIATION, Niles, Michigan. Spring class in flying starts May 10th. Enroll now. Instruction under expert pilots. No deposit for soloing. Write for information.

J. R. WILLIAMS, NILES AIRWAYS.

MISSOURI

NICHOLAS-BEASLEY AIRPLANE CO. Complete flying instructions, by hour or by complete course, primary, cross country, advance training, solo. New ships and new motors. Instructors who take an interest in you. No deposit required on solo flight. Write for full particulars. **MARSHALL, MISSOURI.**

MISSOURI

LEARN TO FLY! *ONLY $100.* Our instructors of long experience, our modern training airplanes, and the best flying field in the Middle West make us the best equipped school in the country to teach you to fly properly. *Enroll Now.*

PORTERFIELD FLYING SCHOOL, *Richards Field,* Kansas City, Mo.

NEW YORK

FLYING SCHOOL—Operated in connection with our shops assuring a Liberal Knowledge of Design and Construction at no additional expense. Competent Instructors. *Reliable Machines.* Passenger Flights and Cross Country Service. Write for Details. **AERIAL SERVICE CORP., HAMMONDSPORT, N. Y.**

NEW YORK

CURTISS FLYING SERVICE INC., GARDEN CITY, N. Y.

Complete Flying Service including Instruction, Aerial Photography, Advertising and Passenger carrying. Fast cross country transportation at a moment's notice to any point with either land or water types. Air fleet of thirty machines. Flying the year round. *Big reduction in rates for Flying Instruction. Write for information.*

NEW YORK

PORT WASHINGTON, LONG ISLAND

FLYING BOAT SCHOOL Clifford Webster—Instructor

Winter Station Jan. 1-May 1 Palm Beach, Fla.

Curtiss Metropolitan Airplane Co., Inc.

OREGON.

FLY IN THE NORTHWEST.

RANKIN SCHOOL OF FLYING - 408 Oregon Building.

PORTLAND, OREGON.

PENNSYLVANIA *PITTSBURGH*

PITTSBURGH-McKEESPORT AIR PORT — 9 miles from business center of Pittsburgh; 2 miles from business center of McKeesport; Fast Interurban Cars past field. *A splendid fourway field — Look for our big circle.* Eastern Distributing Point for Swallow Airplanes. *Office address,* 504 STANDARD LIFE BLDG., Opposite P. O., PITTSBURGH, Pa. *Visitors Cordially Welcome.*

PENNSYLVANIA

PITCAIRN AVIATION, Inc.

Land Title Bldg. Philadelphia.

4-way flying field, largest in East, on Doylestown pike, above Willow Grove.

4 instructors, ideal flying country, busy field, reasonable board. Our flying course includes meteorology, map-reading, etc. Waco, Standard, Oriole and Jenny airplanes available for graduate students at low rate. No liability bond required.

WRITE FOR BOOKLET.

TEXAS Year-round Flying

SAN ANTONIO AVIATION & MOTOR SCHOOL

Expert instruction in flying and mechanics

Free sleeping quarters at Airdrome

AIRPLANES, ENGINES, PARTS, SUPPLIES, SHOPS, HANGARS, OX5s, Hissos, Liberties, Jennies, Canucks, Standards

Large stocks on hand, prompt shipment, best values.

Office 509 Navarro Street San Antonio, Texas.

WEST VIRGINIA **SHANK McMULLEN AIRWAYS, Inc.**

Flying school second to none. Thorough instruction on flying boats and airplanes by expert ex-army instructors. Complete flying service including photography, advertising, exhibition, passenger and fast cross-country transportation.

HUNTINGTON WEST VIRGINIA

WISCONSIN

All types commercial flying. 24 hour field.

Repairing and overhauling planes and motors.

EBERT AIRCRAFT SERVICE DEPOT-Operating Hamilton Airport.

Station "D," MILWAUKEE, WIS. Tel. Cudahy 436.

INDEX TO ADVERTISERS

A

Aeroplane, The 645
Advance Aircraft Co..... 620
Aircraft Service Directory..... 650-651
Alexander Aircraft Co..... 644
Anderson Aircraft Mfg. Co..... 651

C

Classified Advertising 649
Consolidated Aircraft Corp..... 619
Crawford Airplane Co..... 651
Curtiss Flying Service, Inc..... 652

D

Decatur Aircraft Co..... 650
Dickerson Steel Co..... 650

G

Guggenheim School of Aeronautics..... 651

H

Hamilton Aero Mfg. Co..... 650
Haskelite Mfg. Corp..... 651
Healey-Aeromarine Bus Co., Inc..... 643
Huff, Daland & Co..... 650

I

Ireland, G. S..... 651
Irving Air Chute Co..... 640

J

Johnson Motor Products, Inc..... 650

K

Kreider-Reisner Aircraft Co., Inc..... 651

L

Lincoln Standard Aircraft Co..... 640
Ludington Exhibition Co..... 651

M

Martin Co., The Glenn L..... 618
Monumental Aircraft Co..... 641

N

Nicholas-Beazley Airplane Co..... 650

P

Peck, Allen F..... 651
Perry-Austen Manufacturing Co..... 644
Phenix Aircraft Products Co..... 651
Pioneer Instrument Co..... 650

R

R. F. D. Co., The..... 651
Ripley Blount & Co..... 646
Robertson Aircraft Corp..... 642
Roza, Art 651
Ryan Airlines, Inc..... 644

S

Scintilla Magneto Co., Inc..... 621
Service Steel Co..... 650
Southern Airways, Inc..... 646
Spalding Construction Co..... 651

T

Tabraham, Geo. E..... 650
Taylor, C. Fayette..... 650
Titanine, Inc. 646
Tri-State School of Aeronautics..... 651

V

Valentine & Co..... 639

W

Wallace Aero Co..... 651
Where to Fly..... 647
Woodson Engineering Co..... 645
Wright Aeronautical Corp..... 622

Y

Yackey Aircraft Co..... 650

AERONAUTIC SAFETY CODE

A Compendium of the Results of Four Years' Study by Leading Engineers, and Government and Civilian Experts of the Aircraft Industry

Sponsored by the U. S. Bureau of Standards and Society of Automotive Engineers, and Approved by the American Engineering Standards Committee, October, 1925.

The Aeronautic Safety Code covers

GOOD PRACTICE AND SAFE METHODS in the Design, Construction, Testing, Operation and Maintenance of Aircraft, Aircraft Engines and Accessories, Airdrome and Airway Equipment

It includes

SENSIBLE RULES OF THE ROAD AND SAFETY PROVISIONS FOR FLYING AND GROUND PERSONNEL

Fifty-two Pages - Well Indexed

AN ESSENTIAL REFERENCE GUIDE FOR THOSE WHO WISH TO BUILD UP PUBLIC CONFIDENCE IN AIR TRANSPORT.

SINGLE COPIES $1.50

A year's subscription to AVIATION (52 issues, $4.00) and a copy of the Safety Code for $5.00.

GARDNER PUBLISHING CO.
225 Fourth Ave., New York

Use the Coupon

GARDNER PUBLISHING CO.
225 Fourth Ave.,
New York.

Check (X) in Square

☐ Enter my subscription to AVIATION and mail me a copy of the AERONAUTIC SAFETY Code. Five dollars to cover is enclosed.

☐ Mail to address below — copy or copies of the AERONAUTIC SAFETY CODE, AT $1.50 each, for which I enclose $

(Name) .....

(Address) .....

CLASSIFIED ADVERTISING

10 CENTS A WORD, MINIMUM CHARGE $2.50, PAYABLE IN ADVANCE.
ADDRESS REPLIES TO BOX NUMBERS, CARE AVIATION, 225 FOURTH AVE., NEW YORK.

WANTED: K-6 and C-6 motors and parts; price must be low. Robertson Aircraft Corporation, St. Louis Flying Field, Anglum, Mo.

WANTED: To trade, racing car, Rago motor. Motor is new in original crate. Motor turns 5100 r.p.m. Car cost approximately $2,000. For good ship, preferably Jenny or Canuck, with OXX6 motor. Write Clarence Eggenberger, Pontiac, Illinois.

FOR SALE: Laird Swallow, excellent condition, special high compression, OX5 motor, $1,250. H. H. Bowman, 600 Bitting Building, Wichita, Kansas.

FOR SALE: One newly recovered and reconstructed Jennie with OX5 motor, practically new, excellent flying ship, ready to fly away, for twelve hundred cash. One reconstructed J.1. Standard, original linen, but in class A condition, with twenty hours, OXX6 motor, ready to fly away, cheap for one thousand dollars. One OX5 Thomas Morse Scout, excellent condition, with ten hour test, very fast ship, with excellent reconstruction throughout, for only one thosuand dollars. Please do not write unless you mean business and have the cash. Each ship guaranteed. Eagle Airport, Hinkley, Ill.

FOR SALE: F5-L Hull and Dollie, nine copper tipped propellers; six radiators, also stabilizers, elevators, rudders, ailerons, and miscellaneous fittings. Address: F5-L, P. O. Box 117, Hampton, Virginia.

FOR SALE: HISSO-STANDARD, condition new, used but 25 hours, DH landing gear, large gas tanks, $1,600. for immediate sale. Wm. Maycock, 12272 Washburn Ave., Detroit, Michigan.

Ten absolutely new and unused OX5 motors, in original crates, make offer. L. L. Adcox, 374 Wasco Street, Portland, Oregon.

FOR SALE: One JN4D, just recovered, installed Government overhauled motor. Ship like new, in A-1 condition. Two OX5 motors, Government overhauled and tested, like new, in original crates, with Dixie mags. Can use Booster for starting, $185.00 each. Two OX5 motors, same as above, with Berling Mags., $175.00 each; used OX5 motors, $125.00 each; used Hisso radiator in A-1 condition, $45.00. G. D. Ludue, 1569 California Street, San Francisco, Cal.

FOR SALE: Aeromarine 39-B land plane, with OXX6 motor, in good flying condition, $700. cash. Laurie Yonge, 634 Riverside Ave., Jacksonville, Fla.

FOR SALE: Jenny, $600. Also pair upper wings for Seagull. Want to buy Standard. Parachute jumper wanted. J. J. Morton, Bayport, L. I.

AVIATOR desires position with company or private plane owner. Some experience with Jenny and Standard planes. Address Ethridge Speer, Bloomfield, Iowa.

FOR SALE: One Jenny fuselage, newly covered, with prop., motor, radiator and tail surfaces, also center section. Write or see George Sticken, jr., Deerfield, Ill.

I wish position as airplane mechanic. Am a graduate of Army A.S.T.S. Two years' experience. Walter G. Laun, Langley Field, Va.

FOR SALE: Curtiss new OX5 motor, stepped up to high compression, only slightly used, splendid, $365.00. Ernest Dryer, 3665 W. 56th, Cleveland, Ohio.

WANTED: Avro 2-seater, or converted 3-place, or other 2 or 3-place machine, in first class condition, ready now. Write particulars and price. Reliance Aero Corporation, Pleasantville, N. Y.

FOR SALE: Three-place "Hisso" Standard, practically new; D-H landing gear and wheels, luggage carrier, and eighty gallon gas tank. BARGAIN. Memphis Airport Company, Millington, Tenn.

PILOT, ten years steady flying, wants change—land or seaplanes anywhere. Box 447 AVIATION.

FOR SALE: OX5, two-place Thomas Morse. Almost new, $900. Will send photo. Lock Box 702. Minneapolis, Minn.

FOR SALE: Reconditioned Avro, 110 Le Rhone, $785.00; rebuilt 110 Le Rhone, complete, $95.00; propellers $10.00; magnetos $5.00; 30 gal. streamline center section tank for Avro $25.00; 4" x 5" aero camera complete $75.00; new Eastman A-1 aero camera $200.00. F.O.B. Kalamazoo, Michigan. WANTED: 3 cyl. 30-35 Anzani; set new OXX6 cylinders. Box 446, AVIATION.

PILOTS WANTED: Single men with army training. Pilots graduating from school (Brooks or Kelly) within the last year preferred. No drinkers or crap shooters wanted. This is a passenger carrying proposition where the utmost care is necessary. Give age and business experience and hours flown in first letter. Box 109, Dearborn, Michigan.

WANTED: Young man with $10,000., pilot or aviation expert preferred, to invest and become one of the executive heads of one of the most promising aviation developments in New England; also pilot with airplane to work on commission, school and passenger flying. Aviation, Room 8, 26 Central St., Bangor, Maine.

HIGH LIFT WINGS: Pep up your old Jenny and make money. Our price will surprise you. New OX5's $325. Sportplane $350. Allison Airplane Co., Lawrence, Kansas.

SEBRING AIRWAYS, INC., SEBRING, FLA. Complete flying service, including instructions, photography and cross-country transportation. Our flying course includes complete mechanical instructions. No deposit required for solo flights. We are Florida distributors for Waco airplanes. Write for information.

FOR SALE: Three-place OX5 Standard, new fuselage, new tail surfaces, good wings, motor completely overhauled. Perfect condition. $1050. B. L. King, 1028 Plain St., Peru, Ill.

Have three racing cars, one Fronty. Have won silver cup with this car, clocked at 118 M.P.H. Daytona Beach car cost $2700. to build; two years old; one 110 Dusenberg that will run 100 M.P.H. Also Hudson racing car that has won several races on beach. Dusenberg cost $1800., Hudson $1200. Will trade car or cars for plane or planes that are in good condition. Preferably Swallow, Travel Air, T.M. Scout or Yackey Sport. I also have real estate will trade. If you have a good plane and some trading blood, write or wire Johnnie Kelley, 307 Franklin St., Tampa, Fla.

LONGERONS, Ash (1¼"x1¼"x14') only $3.; OX5 Jet Wrenches, 35c; Scalloped Tape, 4c yard; Leather Helmets, $3. Goggles, $2.50; Wanted: Used OX5's Standard J1 Parts. Ostergaard Aircraft, 4269 North Narragansett, Chicago.

THE Aircraft Service Directory

WHERE TO PROCURE EQUIPMENT AND SERVICES

Speed & Drift Indicator

PIONEER INSTRUMENT COMPANY
MAIN OFFICE AND FACTORY BROOKLYN NEW YORK
WASHINGTON 441 STAR BUILDING
PARIS 97 BOULEVARD SAINT MICHEL
SAN FRANCISCO 15 SPEAR STREET

TRADE HAMILTON MARK
PROPELLERS

OX5 water pump assemblies, $6.00. Exhaust manifold, each side $3.50. Crank case, lower half, $22.00, valve intake 30c. Valve exhaust 40c, Standard J-I upper wings, $50.00 to $100.00. Lowers $30.00 to $60.00. New Standard J-I airplanes, complete with motors, $900.00 up. Our stock is complete. Immediate delivery. Flying school open the year around. Write for new catalog.
NICHOLAS-BEAZLEY AIRPLANE CO.
MARSHALL, MISSOURI.

WHEN YOU WANT to buy, sell or exchange planes, motors and accessories—or are in need of competent help, or seeking a responsible position AVIATION Classified or "Directory" ads will prove advantageous. AVIATION, the only aeronautical weekly, covers your entire field first.

YACKEY TRANSPORT
Liberty 12 motor. Landing speed is 32 miles per hour, high speed 125 m.p.h.; useful load 2400; ceiling with load 22,000 ft., duralumin construction throughout. Best performing ship ever known. Price $7,500.00.
Yackey Aircraft Co., Yackey's Checkerboard Airplane Field
DesPlaines River & Roosevelt Road FOREST PARK, ILL.
(Suburb of Chicago)

Air Spec. 10225D
SEAMLESS STEEL TUBING
Complete Warehouse Stock
for Immediate Shipment in any Quantity.
SERVICE STEEL CO. 1435 Franklin St. DETROIT, MICH.

The Safest Plane in America
"STALL-PROOF" PETREL
"LOW MAINTENANCE"
Five Years Without a Single Fatality
Write For Details on Our Commercial Models Four and Five
HUFF DALAND AIRPLANES, INC.
BRISTOL, PA.

New
— LIBERTY MOTORS —
WITH ALL THE LATEST IMPROVEMENTS.
CAN SUPPLY FROM STOCK ANY NEW "LIBERTY" PARTS DESIRED.
WRITE OR WIRE FOR PRICES.
JOHNSON MOTOR PRODUCTS, Inc.
518 West 57 St., New York.

C. FAYETTE TAYLOR, M. E.
Consulting Mechanical Engineer
Massachusetts Institute of Technology
CAMBRIDGE, MASS.
Specialist in Aeronautical Engines and Marine Engines

THE AIRCRAFT SERVICE DIRECTORY
Brings You Into Weekly Contact With
THE ENTIRE AERONAUTICAL INDUSTRY

We Specialize in Simple and Alloy Steels to U. S. Government Specifications.
Most grades are carried regularly in our warehouse.
Hot and cold rolled bars and strips.
THE DICKERSON STEEL COMPANY
DAYTON, OHIO.

DECATUR AIRCRAFT COMPANY
DECATUR, ILLINOIS.
New and Used Ships for Sale
Parts for JN4D-JN4C or Standard J1 Ships
OX5-OXX6-Hisso or Liberty Motors
Complete Flying Course—$150.00
Write for our new catalog

Advertisements inserted regularly in
AVIATION'S AIRCRAFT SERVICE DIRECTORY
pay for themselves many times over.

MICHIGAN DISTRIBUTION
OF
SWALLOW AIRPLANES
BY
GEO. E. TABRAHAM Kalamazoo, Michigan

AIRCRAFT SERVICE DIRECTORY

CONTINUED

U. S. and Foreign Patents and Trade Marks — Ex-Pilot U. S. Air Service

ALLEN E. PECK

PATENT AND TRADE-MARK LAW

709 Barrister Building
635 F Street N. W. — Washington, D. C.

HASKELITE PLYWOOD

Only Plywood made to pass strict Grade "A" Navy Specifications.

Can be furnished in any size or thickness.

HASKELITE MANUFACTURING CORPORATION
133 W. WASHINGTON ST., CHICAGO, ILL.

EVERYTHING FOR THE AIRPLANE

Send for Our Catalogue

LARGEST AIRPLANE SUPPLY HOUSE IN THE WEST
A complete line of parts and accessories for aircraft at lowest prices.
A money-back guarantee on everything sold.
WRITE OR WIRE US YOUR REQUIREMENTS.

CRAWFORD AIRPLANE COMPANY
"Masters of the Air."
350 WASHINGTON BLVD. VENICE, CALIFORNIA

LUDINGTON EXHIBITION COMPANY

Passenger Flying
Instruction
Victor Dallin—
Aerial Photography

AGENTS FOR WACO NINE

Spares of All Kinds
Sport Farman Ships
Aerial Taxi Service
Exhibition Flying

Office: Atlantic Bldg. PHILADELPHIA
Flying from Pine Valley Field PINE VALLEY, N. J.

CLEAR NITRATE DOPE

Best Quality and Freshly Mixed at $1.60 per Gallon. Four Coat New Process Aluminum Nitrate Dope $2.05 per gallon.

All in 5 Gallon Boxed Cans.

PHENIX AIRCRAFT PRODUCTS CO., Williamsville, N.Y.

Daniel Guggenheim School of Aeronautics

Courses in Aeronautical Engineering and Industrial Aviation. For particulars apply to the Dean of the College of Engineering,

N. Y. University, University Heights, New York, N. Y.

TWO PLACE, OX5, T.M., WITH FOUR UPPER WINGS, JUST REBUILT, $1,275. OX5 toothpick props., metal tipped, $18.00. OX5 valves 45c. Burd rings 35c. One 80 H.P. Le Rhone motor, used two hours, complete, prop. mounting, caserole, T.M. gas and oil tanks, and two 26 x 3 wheels and tires, all for $75.00. T.M. lower wings $15.00 each. Cash Must Accompany Order.

ART ROZA
1347 SO. 60th ST., CICERO, ILL.

OX-5 MOTORS

New OX-5's in original crates with tools	$350.00
New OX-5's built up in our factory	325.00
Rebuilt OX-5's new cylinder, new valve, etc.	275.00
Rebuilt OX-5's new cylinder, new valves and some other parts, slightly used	250.00
Overhauled OX-5's Government and our shop	225.00

ALL TESTED AND GUARANTEED
ANDERSON AIRCRAFT MANUFACTURING Inc.
ANDERSON, IND.

HANGARS

PORTABLE HANGARS or PERMANENT HANGARS
SPALDING CONSTRUCTION COMPANY
125 EAST 46th ST., NEW YORK CITY
Our portable hangars for 2 planes cost $1600. and for 4 planes cost $2100. Delivery in 30 days.
DESIGNERS & BUILDERS of 6 U. S. AIR MAIL PERMANENT HANGARS

SHIPS FOR IMMEDIATE DELIVERY

JN4D's	$750.00 & UP	COMET OX5	$2000.00
HISSO JENNY	1500.00	COMET K6	4000.00
REBUILT C-6 STANDARD			1750.00
SPECIAL OX5. RACER, METAL PROP.			2500.00

Used and new OX5 motors, airplane parts and supplies.
G. S. IRELAND, GARDEN CITY, N. Y.

FLOTATION AIR BAGS.

To any specification and design.

Send rough sketch of fuselage showing dimensions, when asking for quotations.

THE R. F. D. COMPANY.
17, Stoke Road Guildford, England.
Cable. AIRSHIPS. GUILDFORD.

Second Successful Year *Second Semester begins April 19, 1926.*

Tri-State School of Aeronautics

FARMERS TRUST BUILDING.
FORT WAYNE, IND.

MORE THAN JUST A FLYING SCHOOL.

Tuition Reasonable *Enroll Now.*

PARTS FOR OX-5 OVERHAUL

8 intake valves, 8 exhaust valves, 16 rings (state whether you want regular .005 or .010 over size); 1 complete set hose connection, 1 set gaskets for $15.00, prepaid, cash with order.

Ask for our catalogue No. 3 of JN parts and supplies.

Kreider-Reisner Aircraft Co., Inc., Hagerstown, Md.

Actual Size

SEND ONE DOLLAR

We will send you by return mail a beautiful pair of sterling silver wings mounted on bar pin with safety catch, also identification card issued by National Flyers Ass'n. These pins are being worn by thousands of aviators, aviation mechanics and boosters.

WALLACE AERO CO., Bettendorf, Iowa.

CURTISS FLYING SERVICE. INC.

	IN 1924	IN 1925
Flew over	100,000 Miles	175,000 Miles
Carried over	3,500 Passengers	4,000 Passengers
Trained	52 Student Pilots	60 Student Pilots

WITHOUT INJURY TO ANYONE!

That's commercial flying! — and it tells its own story of competent personnel, good equipment, and careful inspection, which make "Speed with Safety" more than a mere slogan.

WRITE NOW FOR OUR BOOKLET
AND RATES ON OUR FLYING COURSE

CURTISS FLYING SERVICE, INC.
GARDEN CITY — NEW YORK